THE IRON TRADE REVIEW

A JOURNAL OF THE IRON, STEEL, MANUFACTURING AND TRANSPORTATION INTERESTS OF THE CENTRAL WEST.

VOLUME XXI. CLEVELAND, O., OCTOBER 4, 1888. NUMBER 41.

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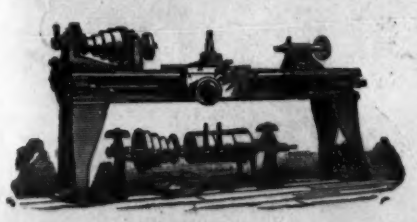

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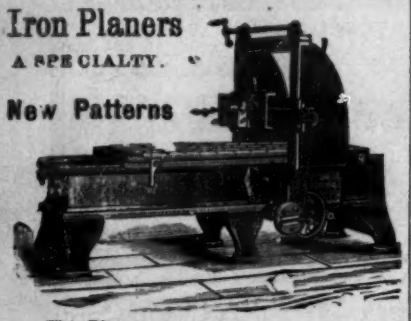

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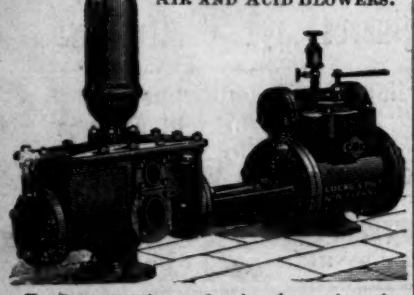

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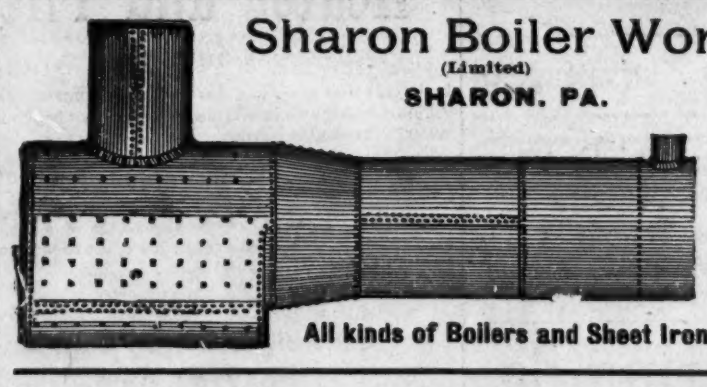

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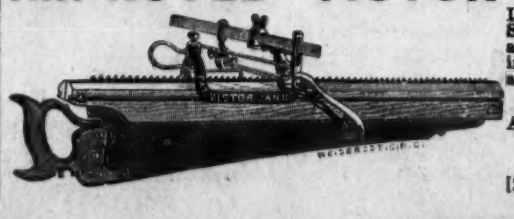

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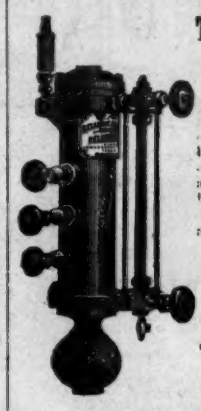

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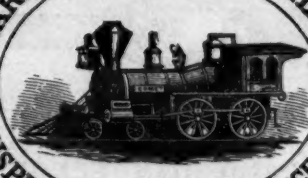

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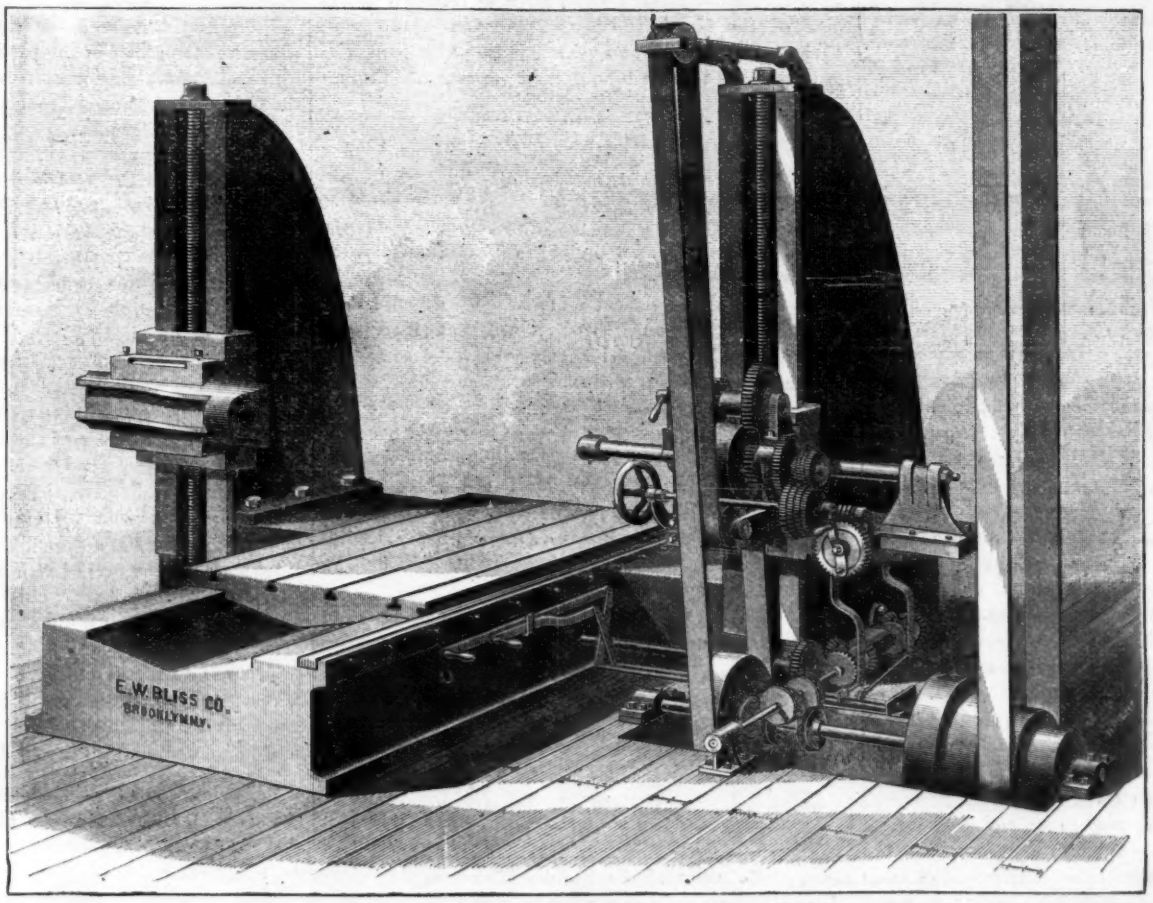
NEW HORIZONTAL BORING MILL.

The illustration represents a boring mill recently built by the E. W. Bliss Co., of Brooklyn, N. Y., for their own use, and which is adapted for general shop work. By means of this tool, holes may be bored parallel to each other in heavy work without resetting the work, and without "travelling" the latter during the process of boring, and it is so arranged, that, while built especially for heavy work, it can be used to great advantage on light, as all hand wheels and levers are convenient to the operator in his position on the right hand side of the machine.

The table is 7 ft. long by 3 ft. wide, and can be "travelled" to bring the work in position by means of a rack driven by power. This is thrown in operation by one of the levers shown at right hand side of bed. The spindle carrying boring bar is of steel 3½" in diameter, and has 24-inch-feed lengthwise. This is carried by a head with 60 inches vertical adjustment upon a strong upright securely attached to the bed, and the cutter end of bar is supported through a bush carried by the tail block upon a similar upright at the left of the machine. The head and tail blocks are raised together by means of screws shown, in a similar manner to that used to raise a planer crosshead. The second lever shown at right hand side of bed throws power onto this adjustment. To compensate for any possible variation in the two vertical adjusting screws, a slight independent adjustment is provided in the tail block, so as to bring the boring bar dead true with the bed. The driving cone pulley is made with 4 steps and a heavy back gear is attached to the spindle, giving eight speeds for the bar. The spindle is fed forward by a rack and pinion driven by a worm gear, and so arranged that the latter may be thrown out, allowing the bar to be run back quickly by hand. This feeding device is driven through gearing from the main spindle and has four rates of feed.



NEW HORIZONTAL BORING MILL.

The main spindle is driven directly by a belt from the floor shaft, and the arrangement is such that the head may be raised or lowered without changing the length of the belt, thus doing away with the necessity of a tightener. Extreme width in the clear between head and tail blocks, eight feet. Weight complete 26,000 lbs.

Relative Advantage of Cast and Wrought Iron Radiators.

Tests have been made by Mr. Wm. Anderson, M. Inst. C. E., England, with cast and wrought iron surfaces in pipes of different diameters and different thicknesses apparently, as the pipes were ordinary 4-inch cast iron and 2-inch wrought iron pipes. Thus, temperature in pipes 190°, in room 60°; difference, 130° F.; results, 232.7 units of heat per square foot per hour for cast iron pipe and 356 units per square foot per hour for wrought iron pipe. Another; temperature in pipes, 160°; in room, 60°; difference 100° F., 147.1 units per square foot per hour for cast iron pipe and 225.2 units per square foot per hour for wrought iron pipe. The cast iron pipe pipe, of probably twice the thickness, gave out 53 per cent. less units of heat, from which it can be seen that the thickness of the metal in radiators is of great importance, and that if the cast iron pipe had been the same as the wrought iron, which thickness is attained in numerous cast iron radiators, a much different result might have been the consequence. These figures also show that the emissive powers of surfaces do not increase in the same proportion directly as the difference of temperature, as it may be observed that the power of emission varies from 9 to 10 per cent. at the given temperatures. Mr. Anderson states, "the rate of emission for differences of temperature of 200° and 100° differed by as much as 22 per cent. At 200° there was 22 per cent. more heat given out per square foot per difference of degrees per hour than at 100°." Practically, the difference between wrought and cast iron of the same thickness is not of much importance.—[Exchange.

Bust of James Watt for the Wallace Monument.

The Wallace monument erected some years ago on the Abbey Craig, near Stirling, is becoming quite a Scottish Walhalla. In the principal hall on the third floor of the monument there had already been placed busts of Bruce, Burns, Scott, John Knox and George Buchanan, and last week there were added busts of other two eminent Scotchmen, namely, James Watt and Hugh Miller, the distinguished geologist and journalist. The bust of Watt was presented by Mr. Andrew Stewart, of A. & J. Stewart, Glasgow and Coatbridge, the well known Manufacturers of malleable iron and steel tubes.—[Ex.

WAGES AT THE EDGAR THOMSON STEEL WORKS.

When the long strike at the Edgar Thomson Steel Works closed, and the men resumed work after a fruitless struggle of over four months, some of the men declined to go back, as they declared that they could not make a living under the arrangement upon which the company insisted on starting the works. This arrangement stipulated that the rate of wages each month should be fixed according to the selling price of steel rails, and experience so far has shown that it is satisfactory. During the month of August machinists averaged $2.90 per day at these works; for night work they get 50 per cent. extra, and for Sunday work their wages are doubled. Blacksmiths make about $2.50 per day. Blacksmiths' helpers' wages range from $1.50 to $1.60 per day of ten hours. While many of the men in the converting mill worked twelve hours per day, their wages were considerably in advance of those of 1887. Although their rate of wages was reduced at the close of the strike, the quantity of steel that can be turned out in twelve hours is so much in excess of that turned out in eight-hour turns that their wages for last month were much bigger than in any month in 1887, before the sliding scale went into effect. Scrappers' wages for the month of August were $8.13 per day. The foremen of the cupolas made an average of $7.87 per day. Their helpers are paid $2 per day. The troughmen made an average day's pay of $4.27. The ingot pourers worked eight hours, and made an average of $4.25 per day. The pull-arounds worked eight hours, and made nearly $4 per turn. Steel blowers get an average days' pay of about the same. The pulpit boys get 82 cents per 100 tons. They work twelve hours. Last month their net earnings were $71.66 each, or about $2.80 per day. The bottom-makers in the converting mill made an average day's wages of $5.50 in twelve hours. The employes of the blooming department made better wages than in any previous month since the erection of the works.

The above showing is made at an establishment where, according to all the theories advanced by the opposers of protection, wages should be at the lowest notch. The firm offered a reduction of wages and made a change in the method of working which was violently opposed by the men. The men stood a fight, suffered a total defeat and had their wages reduced. Yet now we find some of them making $7.87 per day, and in branches that can hardly be called skilled labor boys get $2.80 for a days' work. This is what "tariff robbery" has done for labor at the Edgar Thomson. Can the friends of tariff point to any similar establishment in free trade England where the workmen get half so much.—[Amer. Man.

IRON vs. STEEL PLATES FOR SHIPBUILDING.

Iron & Coal Trades Review, London.

It is particularly interesting and instructive to take note of the changes which have been brought about in the iron trade since cheap qualities of steel began to supersede the use of iron for many purposes. Our readers will remember what a flourishing industry the iron rail trade was for many years, and especially during the three years that followed the conclusion of the Franco-German war, and they will also remember how quickly that industry collapsed. But the competition of steel did not end there; it has invaded the domain of the iron plate-maker, and the progress reported in the use of steel for shipbuilding purposes during the last five years has been wonderful—indeed, it has bidden fair to "improve" the iron ship plate off the face of the earth. The future of the makers of iron ship plates a short time ago undoubtedly looked very discouraging, as they seemed likely to meet with a like fate to that of the iron rail maker. Little more than ten years ago such a thing as a steel ship was almost unknown, but the employment of steel at the shipyards then began to increase—for five years slowly, as the material was looked upon with considerable suspicion by a good many builders, who were very shy of adopting it till experience had fully proved its value. In the last five years there has been a remarkable increase in the use of steel for shipbuilding. Thus, while only 7 steel vessels were launched in 1878, and 63 in 1882, the number last year was 391, and this year it will be still greater. The following table appearing in the annual report of the British Iron Trade Association will show the progress made by steel as a material for shipbuilding and how it is displacing iron. It gives the number and tonnage of the iron and steel vessels launched and classed in the United Kingdom:

Year.	Steel.		Iron.	
	Number.	Tonnage.	Number.	Tonnage.
1878	7	4,47[illegible]	43[illegible]	517,692
1879	9	16,[illegible]80	318	470,964
1880	23	3[illegible],373	3[illegible]5	4[illegible]9,994
1881	23	42,[illegible]07	452	[illegible]66,7[illegible]4
1882	63	125,841	525	[illegible]51,[illegible]75
1883	109	166,428	644	93,774
1884	92	132,457	515	661,201
1885	118	165,43[illegible]	260	[illegible]90,[illegible]79
1886	220	267,000	.. .	214,233
1887	391	46[illegible],792	.....	111,[illegible]38

The advantages of using steel for shipbuilding have been prominently set forth before our technical and scientific societies, and it was generally accepted that just as iron superseded wood about thirty years ago so would steel supersede iron. It was proved to be tougher, more elastic, and less damage likely to be caused by collisions, stranding, etc. Lighter plates could be used for a given class of vessels, which would go some way to counterbalance the higher first cost of steel plates, besides which less expense would be incurred in repairs. There seemed to be little hope for the iron ship plate manufacturer's trade, and it certainly appeared as if, in a short time, he would find his occupation gone. But the events of the last few months have proved that there is still considerable vitality in the iron ship plate trade and that the makers will not have to shut up so soon as was expected. There has sprung up a very pressing demand for their production once more, and firms who, last year, thought that they were not likely any more to make ship plates, on a large scale at any rate, now find that the demand is more than they can supply; in fact, they have more work than they have ever had before, and are well sold for some months ahead. That there has been a resuscitation in the manufacture of iron ship plates is apparent from the fact that in the North of England during the two months ending June 30 h last (the latest returns available), the firms supplying statistics to the Board of Arbitration delivered 35,558 tons of iron plates and 7,558 tons of iron angles, whereas in the corresponding period of 1887, they only supplied 25,618 tons of plates and 5,743 tons of angles. There seems to be among some of the ship owners still a preference for the iron vessel, because they hold that experience will prove that it will not suffer so much from corrsoion, and that the cost of repairs will be greater in the steel vessel. Be that as it may, it is a fact that there has been an unlooked-for increase in the demand for iron for shipbuilding purposes, and that the manufacturers thereof are better situated than they have been for years, a state of affairs which promises to continue. Thus the improvement in the shipbuilding industry has not benefitted the steel works alone, as it might have been expected to do, judging from the manner in which steel has hitherto been superseding iron.

Industrial Interests of the South.

There are elements at work in the Southern States, which will prove fatal to a continuance of their political compactness. Such of them as are losing their former distinctive agricultural character, through the growth of their commerce and industries, will gradually change their political character also. There is nothing else so selfish as capital, nothing else so influential in creating public opinion. When States adopt manufacturing industries and commence opening up their mines of coal and iron, cutting down their timber for the saw, plane and lathe instead of for the fire-irons, erecting furnaces and forges, building mills, factories and shops, constructing railroads, they will soon begin to consider politics from a business point of view. The tariff is not popular in the South, but it will be, for, it is a purely business matter.

A peculiarity which will be remarked of Southern progress is, that it is greater in every way than in that of population, but it has only been very recently that intelligent, organized efforts of any sort have been made to turn the flood of immigration or emigration southward. Now such efforts are being made and with some degree of success. Immigration, however, always follows capital, and the work that capital is projecting and pursuing in the Southern States must have workers, and others than the unskilled, uneducated colored men. The influx of new men in the South, who will go there not only from foreign countries, but largely from the Northern States of the Union, will before many years work social, economic and political revolutions there. Southern industries need and will have protection against ruinous foreign competion as certainly as will those of the North, and just so fast as the South grows in industrial stature and vigor so fast will it turn from the policy of free trade to that of protection.—[Public Ledger.

The Coke Industry of Liege, Belgium, in 1887.

Mr. Louis Timmerhans, divisional director of the mines, has published his annual report on the situation of the mineral and metallurgical industry in the Province of Leige during the year 1887. The following is extracted from it:

The manufacture of coke amounted to 534.511 tons, against 509,644 tons in 1886; showing an increase of 24,867 tons. It is astonishing that this increase has not been greater, seeing that the large furnaces of the province have consumed 50,000 tons more this year than last. The extra quantity used has greatly reduced the stocks. There were 1.425 ovens in activity and 601 ovens inactive, giving employment to 601 workmen, and having consumed 754,203 tons of coal.

The selling price has remained almost stationary, it was 12 49 francs against 12.52 francs in 1886, being a reduction of only 3 centimes.

The following is the total exportations of coal and coke from 1878 to 1887:

Year.	Coal. Tons.	Coke. Tons.
1878	386,[illegible]00	166,670
1879	377,000	155,540
1880	4[illegible]3,695	199,151
1881	490,777	211,908
1882	432,892	255,039
1883	48[illegible],788	239,760
1884	5[illegible]7,93[illegible]	154,483
1885	64[illegible],197	180,5[illegible]5
1886	6[illegible]6,2[illegible]8	169,873
1887	707,354	166,065

Solution of the Smoke Nuisance.

The Manchester *Examiner* has a correspondent who offers the following solution of the smoke nuisance difficulty. It has, at least, the merit of being easily tried as an experiment. He says: The best way to render our towns free from smoke is to make no smoke. Some persons may think this is an impossibility; but if the following figures are correct, it is not only possible, but highly probable. The figures are professed to be the result of trials made in the last few weeks at a bleach works near Nottingham, and are said to be verified by representatives of the owners of the works, as well as by those of the London Merchantile Gas Company, Limited, who supplied the gas and coke producers. Here they are

	Lbs. coal.	Lbs. smokeless fuel.
Coal used in gas and coke producers and in the boilers to raise the steam to 81 lbs.	608	504
Do. the next hour	785	224
Do. average per hour while working	471	224
After evaporated, do	3,483	3,513
Do. per pound of coal	7¾	1[illegible]⅓

The smokeless fuel is simply small coal turned into gas and coke. The gas and coke are then burned in the boilers instead of coal; and, according to these figures, gave more than double the heat.

SOURCES OF IRON ORE SUPPLY.

In his recent address before the Franklin Institute, Mr. John Birkinbine gave the principal source of iron ore supply in the United States as follows:

	Gross Tons. 1886.	1887.
Marquette District, Lake Superior Region	1,621,887	1,836,953
Imported iron ores	1,099,433	1,[illegible]91,3[illegible]1
Menominee District, Lake Superior Region	880,006	1,198,743
Gogebic District, Lake Superior Region	7[illegible]6,[illegible]81	1,237,704
Cornwall Ore Hills, Pennsylvania	6[illegible]8,0[illegible]4	667,210
Lake Champlain magnetites	663,752	788,[illegible]84
New Jersey magnetites	5[illegible]0,501	54[illegible],899
Missouri mines	379,776	427,785
Ohio ores, carbonates and hematites	341,489	3[illegible]7,465
Vermilion Lake District, Minnesota	3[illegible]4,396	394,252
Cranberry Mines, North Carolina	24,106	45,032

The following estimates are based upon an average yield of ore and pig iron production in 1886:

	Gross Tons. 1886.	1887.
Alabama	670,000	746,000
Tennessee	470,000	600,000
Virginia	380,000	450,000
Georgia	95,000	105,000

It will be noticed that the Gogebic range outstripped the Menominee range in 1887, owing to the unusual activity in opening the mines, and that the Lake Champlain district shipped more ore than the Cornwall Ore Hills in 1887.

The following shows the approximate total production of iron ore to date in prominent mining centres:

Lake Superior Region (thirty-two years)			35,700,000
Of which Marquette District supplied		2[illegible],200,000	
" Menominee " "		7[illegible],000	
" Gogebic " "		2,000,000	
" Vermilion " "		1,000,000	
Lake Champlain Region, N. Y. (eighty-four years)			13,500,000
Of which Port Henry supplied		8,000,000	
" Crown Point "		1,500,000	
" Chateaugay "		2,000,000	
" Other mines "		2,000,000	
New Jersey (about 100 years)			16,000,000
Cornwall (about 140 years)			7,900,000
Missouri			
Iron Mountain supplied		2,750,000	
Pilot Knob and other mines		1,250,000	

From the Chapin, Norway and Vulcan mines were won nearly one-half of the product of the Menominee range. While almost seventy per cent. of the output of the Gogebic range came from the Colby, Norrie, Ashland and Aurora mines.

Do You Know Him?

"I never employ a man who knows it all," said a large contractor the other day. "Give me a modest, neat-looking man," he continued, "and I'll hold you a dollar he is a good workman, and one that may be relied upon; though, of course, that sort of a man seldom comes in search of employment. Bragging fellows, who state they can do anything from dressing a board to designing a cathedral, are quite numerous, and may be had at any moment." Doubtless this is true, but it does not argue that there are not many of the modest workmen. There are plenty of them, good reliable fellows—fellows that never or seldom have need to seek employment. They are always engaged. Most of them own their own homes, are intelligent chaps, modest in their own neighborhood, the best of citizens, have neat and thrifty wives, and healthy, happy children, and their country is proud of them, for it understands that they are towers of strength and bulwarks of true freedom. It is not from this class anarchists or noisy demagogues are drawn; they do nothing until they have first considered the results, and all their actions are tempered with wisdom, hence their ability to become good mechanics. —[Exchange.

Railroad Gauges of the World.

Recently published statistics of the railroad gauges of the world show that nearly three-quarters of the total railway mileage of the world is of the standard 4 foot 8½ 9 inch gauge. The total mileage of the world at the close of 1885 was 303,048 miles. Of this, 74 per cent. was of the above gauge, 14 per cent. was narrower, and 12 per cent. was wider than the standard. In America, apart from the comparatively small mileage of the United States roads with 3-foot gauge, practically the whole of the United States and Canadian railroads are of 4 foot 8½ inch to 4 foot 9 inch gauge. In Mexico, in 1884, 2,083 miles were 4 foot 8½ inch and 944 3 foot gauge.—[Bradstreets.

Coke in France.

The imports of coke into France the first half of 1888 were 641,699 tons, against 589,832 tons the same period in 1887. Of this quantity, 72.88 per cent. were from Belgium, and 25.20 per cent. from Germany.

A Belgian Coke Syndicate.

THERE is a movement on foot to establish a Belgian coke syndicate at the beginning of the present month (September). Belgian coke was worth 11s. 3d. to 11s. 8d. ($2.72 to $2.82).

CHEAP FUEL.

Manufacturers everywhere are constantly searching for cheap fuel. The close competition in all industries necessitates a reduction of all working expenses to the lowest possible point, and as fuel is one of the heavy items of expense, the demand for cheap fuel is never fully satisfied. The discovery of natural gas seemed at one time to have solved the question, so far as the sections where it is found are concerned, but it is now evident that the supply is being exhausted, and manufacturers who have depended upon it, are now looking for something to take its place. Manufacturers who have used gas as a fuel are not disposed to go back to coal, the superiority of the former, it is said, being very great. Various processes to meet the demand for cheap fuel are beginning to claim public attention, and fortunately they are of such a character as not to be confined, like natural gas, to any one section, but can be used anywhere. We have recently given an accouut of the fuel gas now used by the Disston Saw Works, near Philadelphia, the cost of which, it is thought, will not exceed 5 or 10 cents a thousand feet. In Pittsburgh, the Eureka Gas Fuel & Light Company is making an oil gas which, it is said, has proved very satisfactory. It has been tried in the large steel works of Oliver Bros & Roberts, supplying all the heat required for a Swindel heating furnace, heating about 36 tons of steel billets a day on the average. It is claimed that the cost was only about one-fifth as great as coal at $1.25 a ton, and very much less even than what natural gas costs Pittsburgh users. Another fuel to which attention is also being called for forging and welding, is crude petroleum, as used in a process owned by the Aerated Fuel Company, of Springfield, Mass., and very strong claims are made as to its cheapness.

This matter of cheap fuel is of vital interest to the South. Natural gas gave those who could use it a great advantage over all others, and while the South had less to fear from competition with the manufacturers who used this extraordinarily cheap fuel than other sections, still it gave to the natural gas regions a great advantage for manufacturing at a low cost. The introduction now of fuels rivaling natural gas in cheapness, and which can be used in any part of the country, takes away the advantage in this line heretofore enjoyed in the natural gas territory, and places all sections on a par so far as cheap fuel is concerned, while all other advantages are on the side of the South. In all industries dependent upon coal as a fuel, the South is, of course, far ahead in cheapness, for the vast coal wealth in the South affords an unlimited supply of the very best grades of coal at the lowest cost.—[Manufacturers' Record.

Chemical or Physical Tests for Steel.

Captain Jones, of the Edgar Thomson Steel Works, Pittsburgh, was in Edinburgh at the meeting of the Iron and Steel Institute, and when invited to speak, said he could not let what Mr. Clark had said about the practice of punching steel plates in America pass without comment. Punching steel plates was a relic of barbarism, and there was an appropriateness about the President's suggestion, to "punch a man who punched a plate." As to the relative cost of punching and drilling he had long since made up his mind about that, for many years ago, in constructing a roof, he had drilled all the holes and found it cheaper than punching. With regard to the use of steel in America they found boiler-makers, bridge-makers and many others using it largely. They had started with physical tests, not chemical analysis, but they had come to the conclusion that physical tests could be met, and yet the metal not be what it should be. The test for boiler plates at the Edgar Thomson Works was higher than that demanded for the boiler plates of the United States cruisers, the limit for phosphorus being .035, and manganese .350 per cent. He had seen steel made in America where the heat had been blown for eight minutes, the manganese being put in cold, and he was of opinion that the reaction had not taken place up to the time of speaking. With regard to steel for bridge construction, he considered that not more than .065 per cent. of phosphorus should be present, and the manganese should be kept low, as that was the great oxidizing agent. He would like to see these conditions enforced by law. In conclusion he wished to impress on his hearers the necessity for judging steel by chemical tests first, and letting the physical tests be subsidiary to them.

Mr. James Riley said it was not the function of the engineer to say what should be the composition of the steel he had to use. That was essentially the province of the metallurgist or the steel-maker. The engineer might insist on any physical tests he liked, but he should not dictate how the material should be made. He entirely disagreed with Captain Jones that engineers should specify for chemical tests and consider them before physical tests in passing material.—[American Manufacturer.

CHAFER'S EXHAUST HEAD.

Chafer's Patent Exhaust Head, herewith illustrated, has been in practical use over seven years. It is so constructed to catch the condensed water fron the exhaust, thereby keeping the roof dry and avoiding the spattering, or throwing water over on the sidewalks, and prevents the accumulation of ice in winter time; it also deadens the noise of exhaust steam. These exhaust heads are used on blast furnaces, stationary and elevator engines, steamboats, breweries and factories, and buildings using steam for heating. The water caught by this exhaust head can be returned back into the boiler room

and used again, thus paying for itself. It will cause no back pressure on the engine, and the escape is almost noiseless. Manufactured by Chafer & Becker, Cleveland, Ohio.

A Feat in Bessemer Steel Casting.

American Manufacturer.

On last Monday one of the most difficult feats in casting Bessemer steel ever attempted was accomplished by the Pittsburgh Steel Casting Company. This was the pouring of the stem post of the war ship Maine, now being built at the Brooklyn Navy Yard. The post is of a peculiar shape with two arms measuring respectively 26 and 13 feet, portions of the casting being 42 inches thick. This heaviest portion is to act as a ram when forming the bow of the vessel. To fill the mold 11 tons of steel were required. The stern post and rudder for the Maine will be cast at the same place. The former will weigh but little less than the casting made the other day, while the rudder will take about 14,000 pounds of steel. Larger castings of Bessemer steel have been made but the peculiar forms of these make them particularly liable to unequal contraction and consequent throwing out of proper shape. After the regulation tests required by the Government shall have been applied, the casting will be sent east on a car built expressly for the purpose and arrangements will be made to cast the other pieces. At this writing the casting is yet in the sand, but it is thought that it will stand the tests.

Effectiveness of Machinery.

As an instance of what can be done by using labor-saving machinery, we may state the gradual introduction of new appliances in a foundry and engine shop, has resulted in 50 men producing as many castings as was formerly turned out by 200 men.—[English Paper.

A LOOK AHEAD FOR COAL GAS.

In the new issue of the "Encyclopœdia Britannica", Engineer James Patton writes as follows on the future outlook for coal gas:

The processes involved in the preparation, distribution and consumption of coal gas still remain essentially the same as when the system was first elaborated; but in all details of the industry numerous improvements have been introduced, resulting in marked economy and efficiency of the system. In the meantime new applications of importance have been found for coal gas in connection with heating and cooking, and as a motive power in in gas engines. Further, collateral industries have been supperadded to the gas manufacturer, which in themselves are of such value and importance that, were the distillation of coal as a source of artificial light to cease, it would certainly continue to be practiced as a source of the raw material of the coal tar colors, and of carbolic acid, etc.

Were coal gas to cease to be made primarily, and principally for artificial illumination, and to become more a heating and cooking agent, or were it to fall into the position of being a mere collateral product of the manufacture of tar, it is certain that the manufacturing processes would be very materially modified. Costly cannel gas, in its high illuminating power, is no better suited for a gas engine than common gas; and for heating purposes a much greater yield of gas might be obtained which in burning will evolve more heat than is sought in making illuminating gas. But as matters now stand the fact is that illuminations, heat, motive power and dye stuffs are all obtained by means of the manufacture as at present conducted is a consideration of much weight in dealing with rival system of artificial lighting.

Throughout the whole experience of gas manufacturers the efforts of inventors have been directed, not only to improve the manufacture of coal gas, but also to supersede its ordinary processes, and to supplant it by gas yielded by other raw materials, or by new systems of illumination. The persistent efforts which have been made to improve gas, and the success which many of the plans exhibit in their experimental stage, warrant the conclusion that the processes and results of the manufacture are still susceptible of much improvement.

When it is considered how exceedingly small is the total proportion of illuminants in coal gas to the bulk of the materials dealt in, it is not dificult to imagine that modifications of processes may be devised, whereby a great increase of lighting effect might be practically available and at the same time a greater percentage of the coal secured for domestic and manufacturing purposes.

Notwithstanding the imperfections of the system of coal gas making—the evil odors which attach to the works, the yet more offensive given off from streets through which the main pipes are led, the destructive accidents which occasionally occur from gas explosions and the heat and sulphurous fumes evolved during its combustion—not one of the numerous substitutes which have been proposed has been able to stand in competition against it in any large town or city where coal is a marketable commodity. As against the system of electric lighting, which is now competing so strongly against it, the ultimate fate of gas may be different. It may be regarded as already demonstrated that for busy thoroughfares, and for large halls and enclosed spaces, electric lighting will, in the near future, supersede gas. The advantages of the electric light for such positions in brilliancy, penetration and purity, are so manifest that its use must ultimately prevail, irrespective of the question of comparative cost, and of the fact that municipalities and wealthy corporations have an enormous stake in gas property.

That the electric light will be equally available for domestic illumination is, however, not yet so certain, and until it is demonstrated that a current may be subdivided practically without limit, that the supply can adapt itself to the demand with the same ease that pressure of gas is regulated, and the lights can be raised or lowered equally with gas lights—till these and other conditions are satisfied, the disuse of gas lighting is still out of sight. Should these conditions, however, be satisfied, there can be little doubt that gas lighting will enter on a period of severe competition and struggle for existence, and in the end the material which at one time was regarded a most troublesome and annoying waste—the gas tar—will, in all probability, excercise a decisive influence on the continuance of the gas manufacture.

THERE are no window panes in Mexican houses. Bars are used instead.

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A. WINTEMBERG, Sup't.

W. M. DAY, Editor.
FELIX ROSENBERG, Associate Editor.
E. C. PECHIN, M. E., Special Contributor.
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CLEVELAND, O., OCTOBER 4, 1888.

WHAT RAILROADS HAVE DONE FOR CONSUMERS.

The whole tendency of late years has been a steadily reduced cost in everything to the consuming public. In our last week's issue, we gave some significant figures from Mr. Edward Atkinson, on the increased purchasing power of wages. In the same article, "Progress from Poverty," in the September *Forum*, he calls attention to the vast benefits that have resulted from the decrease in railway charges for moving freight.

"The prime factor in the progress of the people of the United States, both in personal wealth and general welfare, has been the development of the railway system. The service of the railways has continued to increase with great rapidity during the last two years, while the price of that service continues to be reduced. The twenty-six great systems of railways which centre in Chicago from East to West, received in the last four years a little less than $640,000,000 for moving food, fuel, materials for shelter and clothing, at a rate of less than a cent (0.8540) a ton a mile. The charge for the service of these same railways from 1866 to 1873 averaged 2.315; the reduction in the rate for the last four years has been 1.461 cents a ton a mile. Had the traffic for these four years been charged this difference, or been charged what was considered a reasonable rate in the former period, the cost would have been $1,091,000,000 more than it actually was. The service of these trunk lines constitute 35 per cent. of the whole railway service of the country; the reduction in the railway charge on all lines has been as great or greater than on these (in all more than $3,200,000,000) for the last four years. While the mass of the people have thus gained in the aggregate more than $800,000,000 a year in the cost of distribution in recent years, as compared to the period previously named, the construction and operation of the railways have been a source of many of the phenominal fortunes of recent years. Of some of these fortunes it may be truly said, that every dollar which has been gained by their owners is but a token of the service which they have rendered to their fellowmen; of others it may be as trully said that each dollar of their gains is but the token of theft, fraud and corruption. It may be that some of the most conspicuous representative men in the railway system have corrupted the judge of a high court, are now in the position of outlaws, incapable of being trusted, and subject only to the execrations of their fellowmen, yet good or bad as may have been the origin of these great fortunes, the railways themselves, under the higher law which controls all the exchanges of men, and in spite of injudicious and restrictive legislation, continue to do their work with ever-increasing benefit to those who consume the products which are moved upon them."

No more potent influence than the railways has been at work to develope energies that otherwise might have lain dormant for centuries. Bleak, sterile hillsides, incapable of sustaining life, but containing countless millions of mineral wealth, have been brought into business juxta-position with fertile fields and abundant crops—the union of the two have developed a prosperity, under wise legisiation, that is the wonder of the world. It has made possible an interchange of raw material and finished product over great inland distance, on such advantageous terms to producer and consumer, as to create a new economic theory, and make a new financial history. It is safe to say, that no people in the world pay as low freight rates as the American. A startling illustration of cheap carriage here, is evidenced by the late shipment of a lot of charcoal iron from Michigan to England. The iron was made at Elk Rapids, Mich.—was loaded on a vessel, and carried through to Liverpool, for 16s.—while the freight for a moderate railway haul from Liverpool to an inland English town, was 11s.

Nor are the low charges for freight on American railways the only benefits received by the American people.

In the September number of *Scribners'*, in the "Article on Railways," the following passenger rates per mile are given:

	1st Class.	2d Class.	3d Class.
Great Britain	4.42	3.20	1.94
France	3.85	2.87	2.08
Germany	3.10	2.32	1.54
United States	2.18		

The first-class passanger rates here, are within a trifle of the rates charged third-class abroad.

It is a pertinent inquiry as whether low rates will continue in the future. We are inclined to think they will. The great advances made in improved rolling stock—the steadily increasing improvement in the road beds, and the use of heavy steel rails, combine to enable railway managers to run their business at low cost, and yet make fairly remunerative returns on investments.

Of course, competition has had, and is now having, a good deal to do with low rates, and there are no present evidences that there is to be any lull in this direction.

CONDITION OF THE FOREIGN IRON MARKET.

The enormous stocks of pig iron in Great Britain would seem to an American an insuperable carrier to any present advance in price and a dangerous menace to any further marked advance in the United States. By late reports, stores in Scotland are 1,009,358 tons ir—Middlesboro, 254,783, and in the hematite district, 276,783, a total of 1,540,789 tons.

These figures show an increase in Scotland, over the same time last year of about 82,000 tons, and a decrease in the other two districts of about 50,000 tons.

At the reported selling price of these irons, adding in each case $6.72, the duty in this country, the iron would stand on the other side at respectively: $16.75, $15.08 and $17.06. Adding to these figures the current ocean freights and handling, anyone can calculate to what extent they are likely to come in active competition with American irons.

The volume of trade shows very light importations of late, and that further advance must be established here to stimulate a shipping movement.

For weary months past, the British iron master has bemoaned his sad condition. A sort of tonic came to him, in the shape of a Mills House Bill capsule, somewhat stimulating his imagination, but a reaction came when he discovered that it took a Senate capsule to complete a cure, and this, at present, was not attainable.

Other causes are at work now to make him feel happier. The demand for home consumption has been, of late, steadily increasing, and an advance of 2s. 6d. has been established in Middlesboro pig, with large sales. Considering the enormous output, this advance, coupled with decreasing stocks, is a most encouranging sign, giving unmistakable evidence of increased business in finished products.

There are other causes also at work, which will shortly be felt. It is a well known fact that there has been no money in prices lately ruling. At 32s. for Middlesboro pig, it is doubtful whether many works have come out whole, even with wages cut to the lowest possible point, and concessions allowed by the railways.

There seem to be evidences of a probable rise in coal. A late dispatch from London, to the New York *Sun*, stated that a syndicate with large capital to advance the price of coal, was rumored.

Irrespective of this, there is a more potent force at work. There is apparently a concerted and wide spread movement upon the part of the miners, to demand more for mining and shorter hours of labor. This, if successful, means higher prices for coal and coke, and increased cost on pig iron. On the other hand, the continental markets show signs of weakness, which may react on English markets.

As far as this country is concerned, the consumption is very large indeed. Our enormous producing capacity causes a home competition that very properly keeps prices below the figures at which England can send us. Wisdom indicates the necessity of adhering to this policy, rather than by an advance, to open our gates to an avalanch of foreign goods.

What the noble Briton hopeth for, is indicated by the following extract from an English trade paper:

"Moreover the rise in the markets in America reported this week will do much to harden them here, and we shall probably have again soon to record some further transaction on American account. It had all but become 'good bye' to America on pig iron account, but the unforeseen cropped up as usual, and a few nice little orders have been welcomed—more to follow, it is to be hoped." Would that we could say "good bye" to England on tin plates!

MAKING COKE IN THE NORTHWEST.

Statements have lately been made in various papers, that some owners of Connellsville coal, propose to ship their coal to St. Paul, Minn., and coke it there, and that a trial lot of 20,000 tons will be forwarded, and an experimental coke oven plant erected.

They base their hope on a profitable return from the fact that they can get very low up freights by rail and vessel, and full prices for the coke, on the ground. With properly constructed coke ovens, carefully managed, fresh mined Connellsville coal will yield about 66 per cent. of coke.

At the outset, the shippers will have to pay handling, rail and lake freight on 34 *per cent. of smoke*. One-third of what it costs for mining and transportation, goes up into thin air from the oven top.

Let us assume some figures, approximately correct, as to the cost of coal at St. Paul by rail and lake:

Say, mining the coal per ton	$ .25
Freight from Connellsville to lake ports, 180 miles	1.25
Freight from lake ports to Duluth	.75
Freight from Duluth to St. Paul, 155 miles	.75
Total	$3.00

Three tons of coal will cost at Duluth $9.00 and produce two tons of coke. As the price of coke by rail at Duluth is probably not less than $5.50, there is apparently a fair margin on the transaction.

But is this all? Not by a long ways. There is an unknown (as far as magnitude is concerned), but certain (in its operation) element entering into the calculation, which cannot be ignored, and which will have a most important bearing upon the commercial results.

This is the positive loss on all coking coals by weathering. Exhaustive experiments have shown that this takes place to a greater or lesser degree in coking coals, according to their physical structure, tendency to absorb oxygen and the presence of pyrites.

To those interested in the matter, a very full paper on the subject will be found in Vol. VIII, page 204, Transactions American Institute of Mining Engineers, by Dr. Kimball. We quote one or two paragraphs:

"The practical effect of the weathering of coal, while some times increasing its absolute weight, is to diminish the quantity of carbon and of disposable hydrogen, and to increase the quantity of oxygen and of indisposable hydrogen. Thus the weathering of coal involves a loss of calorific carbon and hydrogen, and a corresponding gain of non-calorific carbonic acid and water; hence a reduction in the calorific power of the coal, and a reduc-

tion accordingly in its value. The oxidation of coal was proved, by Richter, to be accelerated by elevation of temperature, and a moderate temperature long continued, produces the same effect as a higher temperature for a longer period."

Prof. John W. Langley, then of Pittsburgh, in 1872, in discussing the weathering of coal, and speaking of the enormous loss in foreign coals from this source, chiefly taking place within three weeks of the mining, said: "I have found in experimenting with our Pittsburgh coals, that they suffer loss even when kept in porcelain dishes in the laboratory of the University, but that if the surrounding air is *perfectly dry*, no apparent loss takes place at ordinary temperatures. On the other hand, the air in its ordinary state contains moisture enough to cause she slow wasting of the fuel, and if coal is kept wet, the change is quite sensible."

The Connellsville coal is particularly sensitive to atmospheric weathering. Those who have mined it, know that if, at any time, the pillars left in supporting the mine are drawn, that the coal in them will not make good coke, but must have a large percentage of fresh room or heading coal mixed with it, to make a marketable product. It has also been determined that the larger the pile the faster the action. The instant the coal leaves the mine this action begins—dumped in a large body in the hold of a vessel, it is greatly accelerated, and particularly so, if the coal has been wet *in transitu*. Any attempt to store a quantity at Duluth, St. Paul or elsewhere, would be establishing conditions leading to the largest possible loss of carbon and hydrogen, and unless all we know thus far should be disproved, the resultant coke would be poor in quality, and unserviceable for the purposes for which it is ordinarily used. What has been said applies with full force to any scheme that looks to the establishment of furnaces on the upper lakes, and shipping coal to be coked there. For successful furnace or cupola work, coke must be made out of fresh mined coal. Coke can be stored indefinitely, without losing its calorific power—indeed, it is generally recognized that it improves with age, and is not affected adversely by any exposure. E. C. P.

THE *Journal* of the United States Association of Charcoal Iron Works, makes the announcement that henceforward it will be a bi-monthly publication devoted to iron metallurgy. For eight years, the *Journal* has been the able and interesting exponent of charcoal iron workers, and has given to the public a large amount of most valuable information. The spirit of progress, controlling the times, has exerted its influence, and now it broadens its scope and widens its field of usefulness. In its new departure, we wish it every possible success, and this we cannot doubt, especially in view of the fact that the services of its energetic and accomplished editor, Mr. John Birkinbine, are retained.

Failure of the Flour Trust.

The flour trust, or "business agreement," as the millers prefer to have it called, seems to be doomed to be doomed to failure. It is the openly-expressed opinion among leading millers, and they among the prime movers in the new departure, that the trust is as nearly complete now as it ever will be. This amounts, in substance, to an admission of failure in attaining the desired object. Every day prices are being cut, and it is almost impossible to fix the guilt of violating the terms of the agreement on any particular person. Excuses are readily given, and each knowing himself to be guilty, cares little to pry closely into the others' methods of doing business. "The fact is," said a prominent miller, "that were we to live up to the terms of the trust, the St. Louis mills would now be all shut down. The reason is plain. The millers of Southwest Missouri and Southern Illinois can secure their wheat for less money than we, and they have also cheaper rates on their flour to Southern points. It is not to be expected that they will advance the price of their flour so as to admit of our successfully competing with them. What remains, then, but for us to turn our custom over to them or else meet their prices?"

The above is indorsed by more than one leading miller, and it is the generally expressed opinion that no flour trust will be successfully organized just yet.—[St. Louis Globe-Democrat.

CLEVELAND'S INDUSTRIES.

I.—OIL PRODUCTS FOR 1888, $20,000,000.

Statistics Collected by the Cleveland Board of Industry and Improvement.

Among the leading industries of this city, giving employment to nearly five thousand persons, and producing articles of commerce which, during the year ending September 30th, 1888, approximated twenty million dollars, is the oil business. From the very inception of this industry, Cleveland has played a prominent part in its growth. Ten years ago 28 per cent. of the crude oil produced in this country was refined in this city, while at the close of 1886 but 17 per cent. of the American output was refined here. Since then there has been a large improvement in this respect, and to-day Cleveland's percentage is rather more than 22.

The nature of the business precludes the availability of reliable data as to the money value of the investments, and the Board of Industry, which has undertaken the work of gathering, for the purpose of publication, of the business statistics of Cleveland, has met with not a few obstacles in its endeavor to furnish correct statements. On the other hand, it may be said, that the manner of refining petroleum is accompanied with such widely varying results, according to the skill or attention of the refiner, that no two refiners will secure identical results. Then, too, it must be remembered that where illuminating and volatile oils are the object sought, there will be found the residuum with its long list of manufactured products; while in the making of the heavier grades of oil, such as lubricators, no such residuum appears. Moreover, each process of manufacture is jealously guarded as a secret, and new experiments are daily made, with a view either to increase the output of the refined or distilled article from a given amount of crude oil or to find new commercial products and transform into articles of value what had been of little use before. Under the circumstances, it will readily be seen that the gathering of reliable figures was a work of no small magnitude, which would have failed altogether but for the confidence placed in the Board of Industry by the interested parties, each of whom furnished his quota of confidential information.

There was refined in this city during the year, 4,560,050 barrels of oil, resulting in the commercial products below enumerated:

Product.	Barrels.	Value.
Illuminating oils	3,421,875	$11,121,093
Naphtha	341,762	985,286
Gasoline	117,416	352,248
Lubricating oils	92,772	1,113,264
Paraffine oils	26,004	130,020
Total barrels	3,979,829	$13 681,911
Other products*		217,500
Total value		$13,899,411

* Mineral sperm, vaseline, cosmoline, paraffine wax, chewing gum, oil tar, petroleum coke, etc.

But this is only a portion of the vast oil industry of Cleveland. Rather more than a year ago there was begun the sale of crude oil, as a fuel, in place of other established fuel. From a small beginning the industry has grown until to-day there is sold for fuel purposes nearly as much crude oil as is refined in this city. The shipments into the Middle, New England, and a very few Western and Southern States, aggregate 10,000 barrels a day, and even California is beginning to use oil fuel. Under boilers, for making steam, about three barrels of oil do the work of one ton of good lump coal. In furnaces, for heating iron, oil has been found a cheap and efficient substitute for other fuel. In the manufacture of brick one half-barrel of oil has been found to suffice for the burning of 1,000 brick, while one barrel of oil will burn 14 barrels of lime. As a fuel, oil is being used by the leading iron works in this and other cities, and its use is spreading day by day. At the average price of $1.50 a barrel, the 1888 sales, by Cleveland parties, of crude petroleum will aggregate $6,000,000. It will be seen, therefore, that the oil business is one of the leading industries of this city, second only to the iron and steel interests.

"Bearing" Copper.

The "bears" in copper have been having a very unhappy time lately. Chili bars have been forced up to as high a figure as £107 10s. cash, and the shorts have been unmercifully squeezed. It seems marvelous that the lesson should never be learned that there is no more dangerous sport than defying a "corner" operation by deliberately selling short. No matter how confident the operator may be that the "corner" is on its last legs, and a collapse immediate. He and those who think and act like him give the syndicate a new lease of power, a new gift of capital to prolong the struggle, by putting it in their power to extort from him the means to carry on the game. It has been said that the copper syndicate are really finding their chief support on this side of the Channel, and that if the aid and comfort they are receiving from our midst were withdrawn, their death-knell would strike very speedily. There is some truth in that statement, but it is quite as true that reckless speculation just now is playing directly into the hands of the "ring." That they own the copper, no one doubts. The only question has been, how long can they bear the load? But while their shoulders bear the strain, the folly of selling what one must go to them to buy, ought, we should think, to be apparent even to the most thoughtless speculator.—[Ironmongery.

New Hydraulic Tube-Press.

A powerful hydraulic tube-press for forming metal and steel tubes from circular plates by pressing or forcing them by the aid of mandrels through dies or annular rings, has just been designed and built, says the *Universal Engineer*, by Henry Bessemer & Co., Sheffield, for the Birmingham Small-arms Factory. The press will be used for the manufacture of tubes of large size, and more particularly for making shrapnel, segment, and other hollow-steel projectiles which the government are now anxious to obtain. Hitherto these projectiles used by the English artillery have been made of either cast iron or steel, but the wrought material has proved so much superior, that forged hollow projectiles are bound to supersede the present cast materials. The press is built entirely of Bessemer steel of sufficient strength to impart a downward pressure of about 1,500 tons, with a stroke of 12 feet. It is also furnished with two cylinders with an upward pressure of 500 tons, for the purpose of stripping tubes from mandrels. This process of producing hollow tubes and projectiles will, it is said, dispense with the old method of boring them from the solid bar, which was not only very expensive, but prevented rapidity and extent of output.

Southern Pig Iron Freights.

The Southern Railway & Steamship Association, under date of the 18th inst., have issued a new schedule of freight rates, to take effect on October 1st, the following being the principal rates, all per ton of 2,268 pounds:

	Birmingham.	Chattanooga.	Sheffield and Florence.
Chicago, Detroit, Hegewisch, Grand Crossing, Peoria, Pullman, South Bend	$4.15	$3.90	$3.90
Allegheny, Bellaire, Pittsburgh, Steubenville, Wheeling	4.80	4.30	4.55
Cincinnati	2.90	2.40	2.65
Columbus, Dayton	3.65	3.15	3.40
East St. Louis, Bellville, St. Louis	3.40	3.15	2.95
Indianapolis, Terra Haute	3 40	3.15	3.15
Kansas City, Leavenworth, St Joseph, Atchison	5.98	5,98	5.53
Louisville, East Cairo	2.65	2.40	2.40
Springfield, Ill., Bloomington	4.40	4.15	4.15

The Queen and Crescent route have issued a circular announcing an advance of 15 cents a ton over their tariff No. 7, dated August 1, 1888, to go into effect October 1.

Deoxidized Copper.

The advantages to be obtained by the use of copper as nearly chemically pure as possible, are generally admitted, whether the metal be used as copper, or in the form of brass, bronze, or the many other alloys into which it enters. The Deoxidized Metal Company, of Bridgeport, Conn., claims that the desired result is secured by the process which is used in its works. The castings of brass, bronze, etc., made under this process, are most excellent, while the sheet copper and brass, and the wire made, when submitted to careful tests, show an unusually high degree of strength, copper wire having been tested up to 70,000 lbs. per square inch, tensile strength. The deoxidized metal also possesses the property of great resistance to acids, so that it can be used for many purposes, where ordinary metal is soon destroyed by the chemical action. Journal-bearings made from this metal have also been tested with very favorable results, while for bells it is claimed that the tone and quality is much superior to oridinary brass.—[Railroad & Engineering Journal.

THE price of European steel blooms and billets has increased, the price of the former $1.50 per ton and manganese $6.50 per ton. This year no ore has been imported because of the advance, while 1,000,000 tons were sold here in 1887. Chicago and Braddock manufacturers are crowded with orders.

THE NEW EDGAR THOMSON RAIL TRAIN.

Since the completion of the new rail train, the Edgar Thomson Steel Works, Braddock, has become the Mecca of rolling-mill men. Lately, a represensative of the *Iron Age* paid a hasty visit to that plant, which served to give at least a general impression of its features. From the old blooming train, with its adjacent bloom chipping hammer, the blooms are delivered on a series of driven rollers, which, arranged on a curve, carry it to what may be termed a switch. They then reach a car running on a track back of the long line of reheating furnaces, of which there are five, each with nine working doors. By an endless iron rope wound on a drum driven by a small special engine, the car may be delivered in front of any one charging door of the series. Every furnace has a pusher, which delivers the bloom into the heating furnace. In front of the heating furnace is a similar arrangement for drawing the heated blooms. A special engine runs an endless wire rope, to which is attached a car. Upon the latter the drawing apparatus, with an ingenious grip, deposits the bloom. The latter is conveyed to the driven rolls, which run the bloom upon the table of the first train.

Practically, Capt. W. R. Jones has divided the ordinary three-high rail train into three, the first five passes being made in one train, the second five in a second train to which the first delivers directly, and the last finishing pass being made in a third train. A crane commands the latter, so that the finishing rolls can be rapidly changed. Each train is driven by its own independent engine, and is practically automatic, one man handling the levers which lift the tables, turn the bloomer, &c. From the table of the first train, the billet goes to the second; from there, by driven rollers, to the finishing train. From the latter the rail is carried along by driven rollers to the hot saws, the metal traveling in all these operations along the axis of one long building. The hot beds are located in a wing at right angles to it, and then are taken back in the direction of their length into the drilling and pressing building, which is parallel to the rolling mill building, they traveling in a direction opposite to that in the latter. The finished rails are pushed sideways out of this building to the cars on which they are shipped. The boiler house has two batteries of 12 boilers each, and we noticed particularly that along one entire side of the rolling mill proper is a bench upon which lie the rolls. The whole arrangement is a radical departure from all former types, and it needs only a glance at the never-ceasing procession of blooms entering at one end and of finished rails passing the saws to appreciate the enormons capacity of the plant. It is rated at 1,000 tons of finished rails a day. Its record even now is 962 tons, and there is probably no exaggeration in the remark made by the engineer of one of the leading Eastern mills, whom we happened to meet just after he had, for the first time, seen the plant, that it would not be a matter of surprise to him if the new mill would arrive at a record of 1,500 tons a day. The mill is certainly an enormous stride in advance, and being practically automatic, would seem to represent the possible climax of labor-saving in that direction. The impression is created by an inspection of it that this new rail mill overbalances in capacity the other parts of the plant, and one or more new blast furnaces, and enlargement of the Bessemer steel department, and notably an addition to the blooming capacity would become necessary in the not distant future. We repeat that this is merely an impression, and that the idea is thrown out without any accurate knowledge of the relative capacity of the different parts of the plant.

Few changes have been made in the other departments. At the blast furnaces one metal mixer is in use, and a second one is being built. On both sides of the Bessemer steel works a hydraulic pusher has been put up, to push the ingots out of the molds, no effort being now made to strip in the pit.

Production of Coal in Great Britain and the United States.

The statistics of the production of coal in Great Britain, just at hand, enable us to make comparisons between the output of that country and this, and to show that this country is rapidly assuming the first place among the coal-producing nations of the world.

The total production of coal in the United Kingdom in 1887 was 162,119,812 tons, of which 106,704 tons were produced in Ireland. The production in 1886 was 157,518,482. This shows that the increase in production in 1887 over 1886 was 4,601,330 tons, or about 3 per cent.

The total production of coal in the United States in 1887, exclusive of slack coal thrown on the dumps, was 129,925,557 short tons, or, reducing this production to the same ton as that used in England, 116,004,961 tons. The production of coal in 1886 was 112,743,403 short tons, or 100,663,752 long tons, showing an increase of 15,341,209 long tons in 1887 over 1886, or about 15 per cent. In other words, the production of coal in the United States in 1887 over 1886 was five times the increase of production in Great Britain. It must also be remembered that in this country natural gas, of which England has no equivalent, has displaced a large quantity of coal, amounting, in 1887, to some eight and a quarter millions of tons. The indications are that it will not be many years before the United States will take its place at the first in the coal-producing countries of the world.—[American Manufacturer.

A New Iron and Coal District.

The South Atlantic & Ohio is a new railroad projected from Bristol, Tenn., to the Ohio River, through Virginia & Kentucky. It is already far advanced and will shortly be completed from Bristol to Big Stone Gap. The Louisville & Nashville, will extend its road from Pineville, Ky., to a junction with this. We copy the following from the *Railroad Gazette:*

"State Geologist, Proctor, of Kentucky, in a report on the iron and coal fields along the line of this road, makes enthusiastic statements concerning their value. In the region of Big Stone Gap there are large fields of superior coking coals. These fields are the nearest of any to the large deposits of high grade Bessemer steel ores in East Tennessee and Western North Carolina, and this road will be the shortest route from the coke to the ore fields. Immense deposits of "Red Fossil" ore runs contiguous to the road for a distance of 14 miles. Analyses show that it will yield from 45 to 50 per cent. metallic iron, and it can be mined at from 50 cents to $1 per ton. There are a number of other large fields. The Norfolk & Western branch into the Cripple Creek region developed a large traffic in minerals in five years, and it is believed this region will be equally prosperous. The country along the road abounds in timber and beautiful variegated marbles. Investments have already been made in this region by iron and steel manufacturers of Pennsylvania."

A Monster Feat in Chicago.

Journal of Commerce.

The completion of the new Jackson street bridge, and the building of the approaches and viaduct, left the entrance to the McCormick manufacturing offices some six or seven feet below the sidewalk. The building had to be raised six feet and five inches, and this enormous and probably unparalleled task is now being accomplished. The building was prepared for the work by the removal from the basement of all the machinery, and 300 men began turning the screws of several thousand jacks, which were to slowly lift the immense weight to the new place. The building is about 100x125 feet. and six stories high, weighing between 16,000 and 20,000 tons. The whole had to be lifted at once, and there is an average of three jacks to the foot under the building. At a given signal the men turn their jacks a certain distance, and then wait for another whistle. The lift is about a foot a day, but it takes a full day to reset the jacks. The total expense of the work will be in the neighborhood of $40,000.

Mineral Production of France.

Provisional returns of the mineral production of France in the first six months of the year give the output of coal, including anthracite and lignite, at 11,077,721 tons, an increase of 798,734 tons as compared with the same period of 1887. The production of pig iron was 821,824 tons in 1888, and 764,643 tons last year; of wrought iron, 428,076 tons, and 378,897 tons in the two years respectively; and of steel, 239,624 tons and 240,313 tons.

Coke and Soft Coal Mixed.

If coke and soft coal are mixed in equal proportions, it is said, the great heat of the coke will entirely consume the smoke of the soft coal, all of which passes off when coal is burned by itself. A little dry wood added to the fire occasionally will also effect some saving. Fuel thus used will be much more economical than either used separately.

THE new locomotives by the Baldwin Locomotive Works, for the New York & New Haven R. R., have enormous boilers and heating surface. The 289 flues have 1,653 sq. ft., and the fire-box 149 sq. ft. of heating surface, making a total of 1,802 sq. ft. The performance of these engines is said to be very satisfactory.

COAL, THE KING OF THE LAKES.

"At least so far as Buffalo and the commerce of the Great Lakes are concerned, Coal is King," says Mr. E. L. Hedstrom in his article in the Buffalo *Express* on the coal trade of that city. He notes that soon after the Erie Canal was opened, Oct. 25, 1825, although Lehigh coal was brought to Buffalo for manufacturing purposes, it was not until about 1850 that any amount of anthracite was sold there for domestic purposes.

He gives the bituminous tonnage by decades. The total anthracite and bituminous tonnage for 1887 has 5,298,490. The total tonnage of bituminous and anthracite, beginning with 1842, for each decade, reveals a marvelous increase in the short period of forty-five years:

BITUMINOUS SHIPMENTS FROM BUFFALO BY DECADES.

Year.	By lake.	By rail.
1842	900	None.
1852	34,665	None.
1862	84,523	None.
1872	78,889	66 000
1882	7,880	1,089,907
1887	None.	1,801,217

TOTAL TONNAGE BITUMINOUS AND ANTHRACITE.

1842	1,800
1852	57,560
1862	239,873
1872	790,876
1882	3,021,791
1887	5,298,490

How would it have been possible, with the slow methods of twenty-five years ago, to transport the 150,000,000 tons of coal mined in this country in 1887, 5,000,000 tons of which came to Buffalo, but for the extension, doubling and quadrupling of railway tracks, with an equipment and service not dreamed of then? The Erie Canal, once the only means of transportation, has itself felt the pressure of competition, and was compelled to reduce tolls (which less than twenty years ago were 78 cents per gross ton) one-half, and at a later day remove them altogether.—[Chicago Journal of Commerce.

A Curious Offer to Canton, Ohio.

Within the past week, a letter was received by the City Council, of Canton, of a curious purport.

A firm (name not given as yet to the public) state that they propose to put up a glass works, employing from 75 to 100 men, which they will double in a year. They manufacture a full line of flasks and fruit jars, and the works, where now located, have been steadily running for the last three years, without a shut down of a day in all that time, except on Sundays and holidays, and that they are now overrun with orders which they cannot take. Now comes the curious part—they give as their reason for leaving where they are, the unreliability of the supply of natural gas, and their desire to locate in some central enterprising locality, where they can secure a steady and cheap coal supply.

There seems to be no question but that natural gas is a most valuable adjunct to a glass works, both cheapening and improving the product. Going back to solid carbon, seems a step backward, and if the works do go to Canton, we shall hope to see them, first turn their coal into gas, which can be done at very low cost, and so unite permanency of supply, cheapness and excellence of product.

Gas, whether natural or artificial is bound to be the fuel of the future.

A New Akron Enterprise.

The Akron Building & Loan Association was organized in this city last evening with a capital stock of $1,000,000. This morning the articles of incorporation were taken to the Secretary of State's office at Columbus, by Sheriff W. B. Gamble, who had other business in the Capital City. The incorporators are the following well-known business men of Akron: Wm. Buchtel, W. B. Gamble, F. M. Atterholt, Esq., F. A. Wilcox, W. A. Pardee, A. H. Noah and E. R. Harper. As soon as the charter is received, the company will organize and be ready for business, and the books for subscription will be open. The shares will be $100 and $500 payable 25 cents per week on each $100. The prime object of the association is to assist industrious people, without homes of their own, to procure them, and it is certainly a commendable enterprise if carried on in the proper manner, as the names of the incorporators fully signify that it will be. The incorporators will hold another meeting as soon as the incorporation papers are returned with the proper signatures.—[Ex.

THE Argentine Pacific Railroad, which starts at Buenos Ayres, has the longest tangent in the world—211 miles, without a curve or a bridge.

Industrial Notes

Blast Furnaces:—

It is proposed to build two 75-ton furnaces at Radford, Va., Mr. Geo. T. Mills, who is at the head of the enterprise, reports that $270,000 have been subscribed, leaving only $30,000 to be raised.

The Etna Furnace, West New Castle, not in operation, is to be relined at once. When the work is completed the furnace will be kept ready to put in operation at any time the iron market demands.

Arrangements are completed for the erection of a large furnace, with 160 tons daily capacity, at Bristol, Va., for producing Bessemer steel. The plan proposes two furnaces of that size and a rolling mill.

The Cartersville (Ga.) Iron & Steel Company are prepared to receive bids, for the erection of two furnaces, one of a proposed daily capacity of 75 tons, and the other, to manufacture ferro-manganese. G. W. Ware is the financial agent of the company.

We are advised that the Jacksonville (Ala.) Mining & Manufacturing Company, have about completed their plans for building a charcoal furnace. Col. J. W. Burke is the principal party interested. They will use the same ores as they use at Anniston.

The Ella Furnace, at Middlesex (Pa.) is once more under blast, after a several months' stop for extended repairs. During the past blast her capacity was 80 tons per day, but on a number of days she made 128 tons a day, and always averaged over 100 tons.—[Amer. Man.

It is stated that the Unaka Land and Timber Company, of Knoxville, Tenn., have organized a $750,000 stock company, among English capitalists, to develop their mineral lands. They will, it is stated, open iron and coal mines, build coke ovens, and erect iron furnaces.

It is reported that the Florence Charcoal, Iron & Chemical Co., Florence, Wis., have selected a site to build a charcoal iron furnace and chemical plant, and will soon begin work. The capacity of the furnace is to be 50 tons daily, and the chemical plant 40 M cords wood annually.

Last week ground was broken at Rankin station, on the Baltimore & Ohio road, for the erection of another large furnace. It will be 18 feet at the base and 78 feet high, and will have all the latest improvements. The firm expects to have it completed and ready to turn the blast on by the first of March, 1889.

A press dispatch from Jefferson, Tex., says: "Much excitement prevails here over Jefferson's prospects for having two large iron furnaces erected by the Chicago syndicate, who have been here for some time looking after the iron ore of the county. They have made a proposition which is likely to be accepted, and will guarantee work to be started soon."

A few days ago the Thomas Iron Company held a meeting at Catasaqua, Pa. The object of the meeting was to consider the advisability of constructing other furnaces at Thomas, near Birmingham, Ala. It was decided to build another furnace and a rolling mill at Thomas just as soon as practicable. The furnace will be a duplicate of the one recently built by the company there. It will be joined to this furnace and operated by the same engine and boilers. By this means the expense of building will not be so great as it would necessarily be otherwise. The furnace will have a capacity of something over 100 tons of iron daily.—[Birmingham Age.

Rolling Mills:—

The capacity of the wire department of the New Castle Wire Nail Works is to be increased by putting in 14 more drawing blocks.

The Oakland Iron Works Company, Oakland, Cal., has been organized with a capital of $50,000. Geo. Cottrell and others are the incorporators.

The Newport (Kentucky) Aluminum & Cast Steel Company, capital stock, $150,000, has been incorporated to manufacture iron, steel, etc., by Adam Wagner, William Spiegel, Charles L. Hartsfeld, H. Gunkel and others.

It is stated that an effort is being made to start up the plant of the Cartwright Iron & Steel Co., at Steubenville, Ohio, which made an assignment about two months ago. The works were formerly known as the Alikanna Rolling Mill.

Decker & Atkins will soon begin the erection of iron mills, a bolt and nut factory, and a large foundry near Charleston, West Virginia. By Spring, the works will be in full blast. This is the first business of the kind ever started in that city. Others are making arrangements to start various factories.

The steel department of the plant of the Pottsville Iron & Steel Company, at Pottsville, Pa., which has been idle for about two months, has resumed operations, giving employment to about 90 men. All departments of these works, consisting of rolling mill, puddling mill and steel department, are being operated to their utmost capacity.

The Shenango battery is having a boom in the iron business. Kimberly's mill at Greenville, is working full. The furnaces at Sharpsville are all in but two. The Steel Casting Company's works at Sharon, are running to their full capacity. The Sharon Iron Co.'s and P. S. Kimberly's mills are running steadily. The Stewart Iron Company's mill and one furnace are in operation. The Middlesex furnaces are working full time.—[Labor Tribune.

M. V. Smith, metallurgical engineer, of Pittsburgh, has just been appointed consulting engineer for the Minnesota Car Company, of Duluth, Minn., with headquarters in Pittsburgh. This new company is composed principally of capitalists from Richmond, Va., the president being John Anderson, of the Tredegar Company. The capital is $400,000, all of which has been paid in. The plant will consist of a rolling mill with two trains of rolls, one 10-inch and one 18-inch, machine shops foundry and car works having a capacity of 30 cars per day. Ground has already been secured, and work on the new buildings will be commenced at an early date. The bulk of the machinery will be supplied by Pittsburgh manufacturers.—[Iron Age.

Iron & Steel Works:—

The new plant of the Allegheny Bessemer Steel Company, at Duquesne, Pa., is rapidly nearing completion, and it is expected to be ready for operations by January 1. The Bessemer department is already finished, and filled with the most modern machinery. In the rail mill hydraulic working machinery will, in nearly every instance, take the place of roll-hands, furnacemen, shearsmen and hot-bed men.

This has been a busy week around the works of the Pennsylvania Steel Company, and No. 2 Bessemer mill shows the heaviest production of steel in its history. No. 2 Bessemer mill produced an average of 975 tons of ingots every day this week, and on Thursday night made seventy-five heats of seven and one-fourth tons each on the twelve-hour turn. This is the heaviest production reached in the history of the mill.

It seems likely that the enormous demand for structural steel will soon lead to the construction of works near this city for its manufacture, in addition to those now being developed by the North Chicago Rolling Mills. There is an organization now in existence called the Calumet & Chicago Rolling Mill Company, which proposes to erect a plant somewhere along the Belt Line, equip it with the modern machinery for the manufacture of structural steel, and compete with the Carnegie Trust, the only company turning out the largest sizes. The capital stock of the company is $500,000, and it is supposed that the proprietors of the Æ na Iron & Steel Works are among the subscribers. The location is not yet decided upon, but the plans for the building and machinery have been drawn. There will be one structure 225x216 feet and smaller ones. It is claimed that the product can be turned out in Chicago at lower cost than in Pittsburgh. The equipment will be of the heaviest. The North Chicago Rolling Mills have been using 21-inch rolls, but it is found that they are not large enough, and the new company will use rolls from 25 to 33 inches in diameter. The steel will be made on the premises.—[Chicago Tribune.

Miscellaneous:—

A charter has been granted to the Boies Steel Wheel Co., of Scranton, Pa. The capital stock is $500,000.

A new iron works company has been incorporated at Hudson, O., under the name of the G. H. Grimm Manufacturing Co., with a capital of $50,000.

The Hoyt Frog & Crossing Co., of Chicago, has been incorporated with a capital stock of $1,000,000 by Frederick J. Hoyt, William E. Wolff and Frank L. Taylor.

The Wilson Manufacturing Co. was recently incorporated at Chicago, with a capital of $300,000, for the purpose of manufacturing automatic regulating valves, faucets, etc. The incorporators are E. F. Brown, Jr., Robert W. Clarke and F. C. Rutan. Also the Oregon Foundry Co., Oregon, Ill., with a capital of $3,000, by Frederick G. Jones, Benjamin F. Sheets and R. A. Austin.

The United States Cold Bending & Coiling Pipe Co. has been incorporated at Chicago, for manufacturing. Capital stock $250,000; incorporators, G. W. M. Reed, G. H. Rozet and J. W. Cotton.

The Sharon (Pa.) Boiler Works are engaged in a contract for a stand pipe to be erected for the water works at Washington, Ind. It is to be 100 feet high, 20 feet in diameter and hold 240,000 gallons of water.

The Vincennes (Ind.) Coal & Coke Co., with a capital stock of $50,000, has been incorporated. Hiram A. Foulke, Allen Tundolpa, Edward Watson, Frank Clarke Job Truman, John Bucke and Charles G. McCord are the incorporators.

The Kansas City *Times* says: The Harrison Rolling Mill has concluded its negotiations for a site, and will begin erecting its buildings in the east bottoms within 30 days. The iron mills owned by the Heims, and now located at East St. Louis, will be moved here shortly.

The Novelty Steel Wheel Co., with a capital stock of $500,000, has been organized in this city. A plant costing $100,000, having a capacity of 30,000 wheels yearly, will be erected at once, but it will be located at Washington, some twenty odd miles from this city, that town having offered special inducements. Washington, Pa., is a natural gas town, and is the county seat of Washington county.

The Phœnix Iron Works, of Meadville, Pa., under date of the 17th inst., writes us as follows: "We are building an addition to our machine shop building 100x40 feet, in which will be located our blacksmith shop and erecting shop, all of the present building, including space now occupied by blacksmith shop and office, will be thrown into the machine shop proper. We have been obliged to get more room and put in additional machinery to keep up with our orders for our new automatic cut-off engine. We expect also to increase our boiler shop facilities in the near future, as we are now crowded beyond our present facilities. We are also building a new office and drafting-room, said building will be 25x50. All the above will be substantial brick buildings."—[Iron Age.

Alex Laughlin & Co., engineers and contractors, of Cleveland, O., report under date of Oct. 1st, that they have contracted with the Ohio Iron Co., Zanesville, O., to erect, equip and place in operation at their works, one regenerative gas furnace with working hearth 7x18 feet, together with the artificial gas producers necessary to operate the same. They have also closed contract with the Lake Erie Iron Co., of Cleveland, O., to erect a furnace with working heath 7x14 feet, for heating iron for their nine inch train; and have just completed two furnaces for the Knoxville Iron Co., Knoxville, Tenn., and two for the Belfont Iron Works Co., Ironton, O., which are working in a very satisfactory manner, and are accomplishing a saving of over 66 per cent. in the quantity of fuel used to heat a ton of iron.

On last Monday, one of the most difficult feats in casting Bessemer steel ever attempted was accomplished by the Pittsburgh Steel Casting Co. This was the pouring of the stem post of the war ship Maine, now being built at the Brooklyn Navy Yard. The post is of a peculiar shape with the two arms measuring respectively 26 and 13 feet, portions of the casting being 42 inches thick. This heaviest portion is to act as a ram when forming the bow of the vessel. To fill the mould 11 tons of steel were required. The stern post and rudder for the Maine will be cast at the same place. The former will weigh but little less than the casting made the other day, while the rudder will take about 14,000 pounds of steel. Larger castings of Bessemer steel have been made, but the peculiar forms of these make them particularly liable to unequal contraction and consequent throwing out of proper shape. After the regulation tests required by the Government shall have been applied, the casting will be sent east on a car built expressly for the purpose, and arrangements will be made to cast the other pieces. At this writing the casting is still in the sand, but it is thought that it will stand the tests.—[American Manufacturer.

INDIA as a food exporting and manufacturing country is making rapid progress. Her exports have increased from $47,500,000 in 1834 to $440,000,000 in 1884, and a large part of this growth has occurred since the opening of the Suez Canal, which materially reduced freights to European ports.

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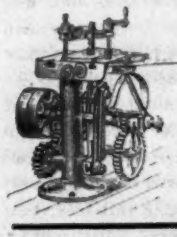

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ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 101 St. Clair St. 81

PICKANDS, MATHER & CO., Iron Ore and Pig Iron, Cor. Bank and Superior Sts. 61

SANGER, A. I., wholesale Scrap Iron. Nos. 173, 175 & 177 Merwin Street. 33

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INDUSTRY FILE WORKS, A. & H. Gough, manf'rs of Files and Rasps, equal to the best English file. Old files re-cut. All kinds of Job Grinding. Office and Works, 38 Columbus and 33 Winter street 13

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CLEVELAND FACING MILLS, Foundry Facings. Cor. Scranton & Carter Sts. 21

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BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water St.

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THE EBERHARD MF'G CO. manfrs of Carriage, Wagon and Saddlery Hardware. 25

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MARKET REVIEW.

OFFICE OF IRON TRADE REVIEW.
CLEVELAND, O., WEDNESDAY EVENING, October 3, 1888.

Iron Ore.

Dealers report continued and pressing inquiries for ores, the demand being equally strong for Bessemer and non-Bessemer ores. They could get considerably more than the advance in freight if they had any ore to sell. The demand is of a healthy character, coming mainly from furnace-men who put off buying until they had a chance to see whether the pig iron market would hold up. They are now convinced of the steadiness of the market and that the advance is perfectly legitimate. It is a significant fact that several ore men, after being compelled to decline further business, have been asked to give prices for an all rail haul to Ohio furnaces, and people in a position to know say that if the price of pig iron continues high, this winter will see some all rail shipments. The objection to handling frozen ore is overcome by permitting the ore to freeze before loading. In such an emergency, ordinary gondola cars could be used, bringing down ore and taking up coal. Coke is getting scarce and will soon advance.

Pig Iron.

Very little can be added to what has been said of this market. The demand for forge as well as foundry irons is very active, and furnacemen decline to accept even large orders for long future delivery, without special inducements. The market is altogether in favor of the furnacemen, but mill men, who could have bought their material for $3 a ton less than they are paying for it now, are anxious to buy, and report a large business. Bessemer irons which, up to within a short time, were plentiful in stock, are very scarce at this time, and command good prices. The consumption remains enormously large, taxing to the fullest extent the stacks now in blast, and still further reducing the already largely diminished pig stocks. We quote, f. o. b. Cleveland, four months:

CHARCOAL PIG IRON.

Lake Superior Charcoal all numbers	22 00@24 50

BITUMINOUS AND COKE IRON.

No. 1 Bessemer	$18 70@19 20
No. 1 foundry, all lake ores	18 20@18 70
No. 2 same	17 20@17 70
No. 1 foundry, lake ores, with cinder mixture	17 20@17 70
No. 2 same	16 20@16 70
No. 1 silvery, native Ohio ores	16 50@17 50
No. 2 same	15 50@16 50
No. 1 gray forge, red short	16 70@17 20
No. 1 gray forge, neutral	16 20@17 70
No. 1 American Scotch (Black Band)	17 70@18 20
No. 2 American Scotch "	16 70@17 70

Manufactured Iron.

The slump in steel rails continues, and Western mills are about to close down, having filled their orders. Shapes are still in demand, but here, too, a falling off is noticed, owing to the advanced season, and the soon-to-be-expected cessation of building. Bar iron is a trifle firmer in tone, selling full up to $1.70, and common sheets are quite scarce in any quantity, the mills declining to engage their output for any considerable lot.

Scrap Iron.

Old American rails continue to be offered freely at $25, but no sales are reported at that figure. Scrap dealers claim that no cheaper prices will prevail this Winter, owing to the fact that the railways will have no more material to sell. One dealer claims to have sold 500 tons of No. 1 wrought scrap at $22.50, but no such transaction can be traced. Wheels are plenty, selling at $20.00.

Hardware.

The trade in shelf and heavy ware is excellent, and jobbers are preparing for the greatest Fall business in many years. Cut nails are dull, at $1.85 for iron, and $1.95 for steel.

CHICAGO PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co., W. W. Backman, Resident Agent.

Except for quite an activity in Lake Superior charcoal iron, the pig iron trade at this point would have been called quiet, or even dull. Several large contracts for that kind of metal have been made, however, and prices for them are correspondingly firmer. Shipments on former orders are going forward rapidly, and most of the consuming interests seem to be prosperous, if the large amount of iron melted is a fair indication.

DETROIT PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by William F. Jarvis & Co.

While the market has shown no signs of weakness during the past week, the volume of business has been a little under that of the previous one. The demand for 50 to 100-ton lots has been up to the average, but no very large sales have been made. Car wheel irons are in the best demand, and more inquiries are received for high numbers than is usually the case, thus showing that old car wheels are scarce, and what few lots are offered, are held at from $1.00 to $1.50 per ton above price of regular brands of Lake Superior charcoal. With a quiet but firm market, we quote as follows (Oct. 1):

Lake Superior Charcoal, all numbers, $20 00@$20 50; Lake Superior Coke, all ore, $19 75@$20 25; Lake Superior coke, cinder mixed, $18 50@$19 00; Standard Ohio Blackband, $19 75@$20 25; Southern No. 2, $17 75@$18 25; Southern Gray Forge, $16 25@$16 75; Southern Silvery, $17 00@$17 50; Jackson County (Ohio) Silvery, $18 50@$19 00; Old Wheels, $20 50@$21 50.

CINCINNATI PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co.

The market has shown a better tone during the week just closing than it displayed last week. There have been but few buyers in the field and not as many inquiries as is customary; but the few have been large ones, and several considerable blocks of iron have been quietly closed in. Necessarily, these have been for deliveries scattered into the future, as the sold up condition of most furnaces render it impossible to make any large sales for early delivery. Prices are firmer than a week ago, but no change to be made in quotations. Prices given below are on the cash basis f. o. b. cars Cincinnati (Sept. 29):

HOT BLAST FOUNDRY.—Ohio and Southern Coke, No. 1, $17 50@$18 50; Ohio and Southern Coke, No. 2, $16 50@$17 50; Ohio and Southern Coke, No. 2¼, $15 50@$16 00; Ohio Soft Stonecoal; No. 1, $17 00@$17 50; Ohio Soft Stonecoal No. 2, $15 50@$16 00; Mahoning and Shenango Valley, $17 50@$18 50. CHARCOAL IRON.—Hanging Rock Charcoal No. 1, $21 00@$22 50; Hanging Rock Charcoal No. 2, $19 50@$22 00; Tennessee and Alabama Charcoal No. 1, $18 50@$19 50; Tennessee and Alabama Charcoal No. 2, $17 50@$18 00. FORGE—Strong Neutral Coke, $14 75@$15 00; Mottled Neutral Coke, $13 50@$13 75; Cold Short Coke, $14 50@$14 75. CAR WHEEL AND MALLEABLE—Southern Car Wheel, $20 00@25 00; Hanging Rock Cold Blast, $22 00@$25 00; Lake Superior Malleable & Car Wheel, $21 00@$22 00.

LOUISVILLE PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Geo. H. Hull & Co.

The market has remained steady during the past week. Sales of iron in small lots have been made, with no large transactions to report. It is thought, however, that during the next two or three weeks, the market will be more active, and that prices will slightly advance. Old rails continue active at $24, and old wheels at $21. It was thought that the trouble in the South, over yellow fever, would curtail the production of pig iron, but furnaces have continued to run steady, and the output has been fairly good. We quote as follows (Oct. 1):

Southern Coke, No. 1, Foundry, $17 00@$18 00; Southern Coke, No. 2, Foundry, $16 00@$16 50; Southern Coke, No. 2¼, Foundry, $15 50@$16 00; Hanging Rock Coke, No. 1, Foundry, $17 25@$17 75; Hanging Rock Charcoal, No. 1, Foundry, $21 00@$23 25; Southern Charcoal, No. 1, Foundry, $18 00@18 50; Silver Grey, different grades, $14 50@$15 25; Southern Coke, No. 1, Mill Neutral, $14 75@$15 25, Southern Coke, No. 2, Mill, Neutral, $13 75@$14 75; Southern Coke, No. 1, Mill, Cold Short, $14 25@$14 75; Southern Charcoal, No. 1, Mill, $15 75@$16 50; White and Mottled, different grades, $13 50@$13 75; Southern Car Wheel, Standard Brands, $23 00@$24 00; Southern Car Wheel, other brands, $19 25@$21 25; Hanging Rock, Cold Blast, $22 25@$25 25; Hanging Rock, Warm Blast, $19 25@$20 25

ST. LOUIS PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co

We have to report a rather quiet market. Sales have been light, and on the other hand, there has been no iron forcing on the market. A few offers for attractive qualities made at concessions failed of going through, indicating a firmer feeling at the furnace end of the line than most buyers, at least, anticipated. We quote for cash f. o. b. St. Louis (Sept. 29):

Charcoal Foundry—Southern No. 1, $18.50@$19.50; Southern No. 2, $18 00@$19.00; Missouri No 1, $17 00@18 00; Missouri, No. 2, $16.50@$17.50. Coal and Coke Irons.—Southern No. 2, $17 00@$18 00; Ohio Softeners, $18 00@21 00. Mill Irons—Southern No. 1, $15 00@$16 50; Southern No. 2, $15 00@16 00; Missouri, $16 00@16 50. Car Wheel & Malleable Irons.—Southern, $20 00@24 00; Lake Superior, $20 50@21 50; Connellsville Coke, East St. Louis, $4 45; Connellsville Coke, St. Louis, $4 60.

PITTSBURGH PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by A. H. Childs.

The market remains in substantially the same condition as at date of last report. Stocks in manufacturers' hands appear to be diminishing, and there is considerable inquiry for iron for November and December delivery, but buyers, as a rule, are slow to make contracts at present prices, being inclined to believe that values will depreciate, while on the other hand, furnacemen are well sold, and decline to make concessions in order to effect sales. The indications are favorable for continued active business. Quotations are (Oct. 1):

PIG IRON.—No. 1 Foundry, $17.50@$18.50; No. 2 Foundry, $17.00@$17.50; Gray Forge, $16.50@$17.00; White and Mottled, $15.00@$16.00; Cold Blast Charcoal, $22.00@$28.00; Bessemer, $18.50@$19.00; four months.

The price of Durham blast furnace coke, at the ovens, is 9s. 3d. to 10s. This is equal to $2.22@$2.40, and is therefore from 1.22c to $1.40 above the present price of Connellsville furnace coke. The price of Durham foundry coke is 10s. 6d. to 11s. 6d., equal to $2.52@$2.76, or $1.27@$1.51 above the price of Connellsville foundry coke.

TO ERECT MAMMOTH WORKS.

The nearly unanimous vote of last Friday, at Jackson, Mich., (more than 12 to 1) in favor of purchasing the Geo. T. Smith Middlings Purifier buildings, and thus affording that great institution a convenient opportunity to secure room to enlarge according to its strength and to enable it to accommodate future demands, is a compliment of the most substantial kind and indicates beyond any peradventure the cordial feeling existing in the city toward it. It is also gratifying to Jackson and serves to promote the general feeling of good-will that the Purifier company decides to remain here rather than to accept a very large and generous bonus to transfer its plant farther west. The details of the new works have been and are being pretty thoroughly discussed by Mr. Smith and his lieutenants, and it has been decided that twenty-five acres will be needed to meet the requirements of the new plant. The location has not been determined on, but the new buildings as at present projected will be three in number, two of one story in height and 1,000 feet long, and one two stories in height and 600 feet long. When fully completed with all the machinery and paraphernalia appertaining to such an immense manufacturing concern, it is expected the cost will not fall much short of half a million dollars. As soon as the details and necessary arrangements can be perfected work will commence, and it is probable the buildings will be ready for occupancy by the first of January next. Should the purchase of the Purifier works, as now seems probable, bring here another large and wealthy corporation employing two or three hundred men, the city will certainly have reason doubly to rejoice over its bargain, and will have accomplished results which will impel it a long stride ahead in manufacturing prominence and prosperity.—[Merchant Miller.

Old and New Engineering.

One of the oldest engineering projects in the world is now gradually approaching completion, and the work will probably be finished during the coming year. This is the canal through the Isthmus of Corinth, in Greece, which was first planned some 25 centuries ago, and on which work was actually begun under the Emperor Nero, so that over 1,700 years will have passed between its beginning and its final completion. As finally excavated, the canal will be four miles long, with a depth of eight meters, or sufficient for the largest vessels which usually navigate the adjacent seas.

It was expected that the canal could be opened about the close of the present year, but the engineers have decided that to secure permanence, and to avoid continual obstructions and expensive dredging, it will be necessary to build retaining walls on a section of about 1¼ miles long, where the excavation is through a light, sandy soil, which cannot be made to form permanent banks.

The total cost of the canal will be about $9,000,000, or $4,000,000 more than the original estimate. Some doubt is expressed as to the possibility of levying sufficient tolls on the commerce which is likely to use the the canal to pay interest on this cost.

The work, it is stated, has been very substantially done, and the cost of maintenance will probably be very light. It has been carried out under the direction of French engineers.—[Railroad & Engineering Journal.

IT has been discovered that a large portion of Utah, is underlaid with a stratum of water, which may be reached by boring wells from 100 to 200 feet. The wells flow so liberally that one of them will water five to six acres thoroughly. The desert is literally "made to blossom as a rose."

LIST OF PATENTS.

Relating to Iron, Steel, Metal, Machinery, Hardware and Mining Interests.

Reported expressly for this paper by H. T. Fisher, (late Ex. U. S. Patent Office), Patent Attorney, 34 Blackstone Building, Cleveland, O.

BEARING DATE SEPTEMBER 18, 1888.

Boiler cleaner, steam, J. S. Roake, Brooklyn, N. Y.
Boiler furnace, W. W. Sutcliffe, New Orleans, La.
Bolt cutter, D. J. Sligh, Kingston, Pa.
Casting horseshoes, flask for, J. I. Freeman, Warren, O.
Iron, manufacturing wrought, L. D Chapin, Hyde Park, Ill.
Metals, material for cleaning and polishing, J. Dean, Cleveland, O.
Nailing machine, A. O. Carmen, Potterville, Mich.
Tubes, mechanism for making seamless, R. and M. Mannesmann, Remschied, Prussia, Germany.
Zinc from the vapors or fumes arising in the process of zinc-smelting, condensing metallic, E. Walsh, Jr., St. Louis, Mo.

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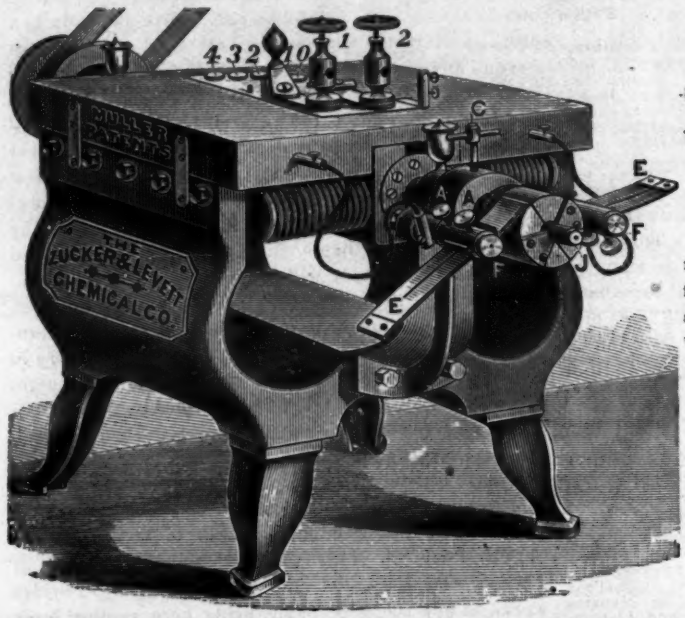

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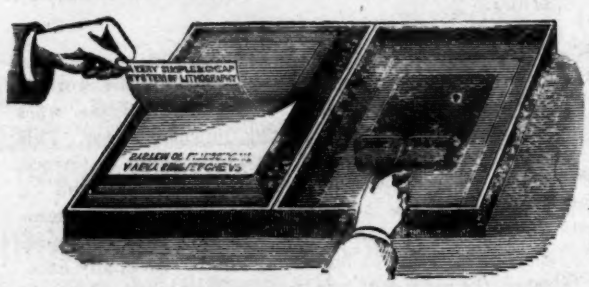

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⅝ 2.45 }
¾ 3.80 }
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Gate, N. E. reversible.....₱ doz $5 20, dis 55&15
Gate, Clark's, Nos. 1. 2. 3.....dis60&10@60&10&0
Gate, N. Y. State .....₱ doz $5 00, dis 55&15
Gate, automatic .....₱ doz $12 50, dis 50
Gate, common sense.....₱ doz pair $4 50, dis 50
Gate, Shepard's .....dis 60&1

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Stove Hollow-Ware, Ground dis.....60&10&10
" " Undground .....70&10
Enameled Kettles.. .....dis 70
Saucepans .....dis 40
Galvanized Tea-Kettles

Inch	6	7	8	9
Each	55	60	65	75

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Planter's, cot.....dis 65&5
Canton.....dis 65&5

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Blair hog ringers.....₱ doz $3.00

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Ceiling Sargent's list.....dis 55&10
Coat and Hat. Sargent's list .....dis 55&10
Wire Coat and Hat. Gem.....dis 45
Wrought Staples and Hooks & Staples. list Jan 12. 1887..... .....dis80&20
Wire Screw Hooks and Screw Eyes. dis 75&10
Hooks and Eyes—Malleable Iron..... .. dis 70
Hooks and Eyes—Brass.....dis 60&10&10

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No.	10	9	8	7	6	
Ausable. ₱ lb	23	24	25	26	28	dis25&10 to 25&10&10
Putnam, ₱ lb..	19	20	21	22	24	.....dis 15

Essex.....33⅓&5

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R. I. Horse Shoe Co., Perkins' Imp. at factory.....₱ keg $4 25
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Standard..... 70
Extra.....55&10
Best.....45&10

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Am. Ice Chisel Pol'd.....₱ doz. $3.00, dis20

Ice Cream Freezers.

American.....50&10
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Crown.....50&10

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Illinois Bolt Co. list.....dis 70

Kettles.

Brass, 7 to 17 inches inclusive.....₱ lb 22c. net.
Brass larger than 17 inches.....₱ lb 24c.
Enameled and Tea Kettles.....See Hollow Ware

Keys.

Eagle, cabinet, trunk and padlock...dis 33⅓ and

Knives.

Russell's Butcher.....net
Moran's Shoe Knives..... dis 20

Knobs.

Carriage, Japanned.....₱ gross 80c. dis 60&10
Base, Rubber Tip.....dis 70&10&5
Hemacite Door Knobs, new list.....dis 40@40&10
Door Mineral.....75c
Door Por. Jap'd.....90c
Door Por. Por.....3 00@3 25
Door Por. Plated.....2 90@3 00

Ladles.

Melting, Sargent's.....dis 55&10
Melting, Monroe's Patent, ₱ doz $4.00, dis 25&10
Melting, P. S. & W .....dis 25&10

Lanterns

Tubular No. 0.....$5.00 per doz
" " 1..... 7 00
Tubular, Lift Wire. No. 0. ₱ doz..... 6 50
Tubular, Lift Wire. No. 1. ₱ doz 7 50
Police. Small. $6.00; Med.. $7.25; Large. $9.75.....dis20@

INDEX TO ADVERTISERS.

PAGE.

Bolts and Nuts—
Hotchkiss & Upson Co., Cleveland, O 10
Colwell & Collins Norway Bolt Co., Cleveland, O 10

Bridge Manufacturers—
Buckeye Bridge & Boiler Works, Cleveland, O 10

Brick and Tile Machines—
P. L. Sword & Son, Cleveland O 18
Frey, Sheckler & Hoover, Bucyrus, O 18

Bicycles and Tricycles—
Fay Manufacturing Co., Elyria, O 2
J. A. Weston & Co., Syracuse, N. Y 10
A. W. Gump & Co., Dayton, O 19

Boilers—
Smith & Teachout, Cleveland, O ..... 10 & 20
Buckeye Bridge & Boiler Works, Cleveland O 10
J. C. McNeil Co., Akron, O 10
City Boiler Works, Columbus, O 10
Mansfield Steam Boiler Works Mansfield, O 10
Reeves Bros., Niles, O 10
Sharon Boiler Works, Sharon Pa 2
Enterprise Boiler Co., Youngstown, O 20
Lane, Bodley & Co., Cincinnati, O 20
Niles Boiler Works, Niles, O 2
John T. Caulfield, Richmond, Ind 12

Bevel Jig Mills—
C. J. McNutt, Ashtabula, O 20

Books—
Cleveland Printing & Publishing Co., Cleveland, O ..... 2&14

Coal and Coke—
W. J. Rainey, Cleveland, O 10
Pittsburgh & Wheeling Coal Co., Cleveland, O 10
Andrews, Hitchcock & Co., Cleveland, O 10

Copying Apparatus—
Felix Daus & Co., New York 12

Cranes and Derricks—
Phœnix Iron Works, Cleveland, O 1
McMyler Manufacturing Co., Cleveland, O. 18
Wm Tod & Co., Youngstown, O 20

Car Wheels—
Bowler & Co., Cleveland, O 17
Cleveland Wheel & Foundry Works, Cleveland, O 18

Catalogues—
Cleveland Printing & Publishing Co., Cleveland O ..... 12 & 17

Coal Screens—
Forest City Wire & Iron Works, Cleveland, O 1

Drilling Machines—
Bickford Drill Co., Cincinnati, O 1
Universal Radial Drill Co., Cincinnati, O 1
E. Gould & Eberhardt, Newark, N. J 2
Lodge, Davis & Co., Cincinnati, O 19

Engineers and Contractors—
E. H. Jones & Co., Cleveland, O 1
Jas. P. Witherow, Pittsburgh, Pa 2
Alex. Laughlin & Co., Cleveland, O 10

Elevators—
L. S. Graves & Co., Rochester, N. Y 2

Electro-Plating Machines—
Zucker & Levett Chemical Co., New York 12

Explosives—

Emery Wheel Machinery—
J. Wendell Cole, M. E., Columbus, O., or Chicago Ill 1
Springfield Glue & Emery Wheel Co., Springfield, Mass 18
Hercules Powder Co., Cleveland, O 12

Engravers and Electrotypers—
Eclipse Electrotype & Engraving Co, Cleveland, O 10
Union Electrotype Foundry, Cleveland O 14
Mugler & Kraus, Cleveland, O 19

Engines (Steam)—
Kilby Manufacturing Co., Cleveland, O 1
G. L. Chapman, Alliance, O 10
Novelty Iron Works, Canton, O 10
Aetna Machine Co., Warren, O 18
C. & G. Cooper Co., Mt. Vernon, O 19
Lloyd & Griffith, Erie, Pa 19
Wm. Tod & Co., Youngstown O 20
Lane & Bodley Co., Cincinnati, O 20

Engines (Gas)—
Schleicher, Schumm & Co., Philadelphia, Pa., and Chicago, Ill 19

Engineers' Specialties—
Crescent Manufacturing Co., Cleveland, O. 14

Forges—
Cleveland City Forge & Iron Co., Cleveland, O 1

Foundries—
Bowler & Co., Cleveland, O ..... 10 & 17
Taylor & Boggis Foundry Co., Cleveland, O. 10
Wm. Fitzsimmons & Son, Cleveland, O 10
Curry & Co., Meadville, Pa 10
Cleveland Wheel & Foundry Works, Cleveland, O 18
Cleveland Foundry Co., Cleveland, O 18

Foundry Facings—
Cleveland Facing Mills, Cleveland, O 10

For Sale—
Foundries, Furnaces, Machinery, etc 14

Flue Cleaners—
Cleveland Flue Cleaner Co., Cleveland, O 14

Files—
Reynolds Bros., Columbus, O 1
Industry File Works, Cleveland, O 10

Feed Water Heaters—
Stilwell & Bierce Manufcturing Co., Dayton, O 1
Laidlaw & Dunn Co., Cincinnati O 18
W. C. Armstrong & Co., Springfield, O 19
Hoppes Manufacturing Co., Springfield, O 20

Fire Hose—
Fabric Fire Hose Co., New York 2

Governors—
Leonard & McCoy, New York 14

Hardware—
Wm. Bingham Co., Cleveland, O ..... 10 & 19
Eberhard Manufacturing Co., Cleveland, O. 10

Iron Roofing—
Sykes Iron Roofing Co., Niles, O 12
Cambridge Iron Roofing Co., Cambridge, O. 18
Garry Iron Roofing Co., Cleveland, O 18

Iron Lime Kilns—
Fred Kranz, Sandusky, O 19

Iron Ore and Pig Iron—
Dalliba, Corrigan & Co., Cleveland, O 10
Tuttle, Oglebay & Co., Cleveland, O 10
E. C. Pope, Cleveland, O 10
J. H. Outhwaite & Co., Cleveland, O 10
Pickands, Mather & Co., Cleveland, O 10
H. E. Collins & Co., Pittsburgh, Pa 10
Cleveland Iron Mining Co., Cleveland, O 10

Key-Way Cutters—
Morton Manufacturing Co., Romeo, Mich 10

Lumber—
Fisher & Wilson Co., Cleveland, O ..... 10 & 18
Martin & Barris, Cleveland, O 10

Lathes—
Muller Machine Co., Cincinnati, O 1
Sebastian, May & Co., Cincinnati, O 19
Gage Machine Works, Waterford, N. Y 19
Lodge, Davis & Co., Cincinnati, O 2
H. L. Shepard, Cincinnati, O 19

Mining Machinery—
American Manufacturing, Mining & Milling Co., Cleveland, O 20

Machinery (General)—
Machinery Manufacturers' Association, Cleveland, O 1
C. H. Presley & Co., Cleveland, O 18
Lane & Bodley Co., Cincinnati, O 20

Machine Shops—
Geo. A. Ford, Cleveland, O 10
Webster, Camp & Lane Machine Co., Akron, O 10
Novelty Iron Works, Canton, O 10

Machinists' Tools—
Wm. Gleason, Rochester, N. Y 10
E. E. Garvin & Co., New York 19

Natural Gas Burners—
Harmon, Gibbs & Co., Corry, Pa 10

Old Metals—
A. J. Sanger, Cleveland, O 10
H. E. Collins & Co., Pittsburgh, Pa 10

Patents—
M. D. & L. L. Leggett, Cleveland, O 1
Jos. A. Osborne, Cleveland, O 2
H. T. Fisher, Cleveland, O 19

Planers (Iron)—
Rochester Machine Tool Works, Rochester, N. Y 2

Pumps (Steam)—
Young & Locke, Titusville, Pa 2
John H. McGowan & Co., Cincinnati, O 2
Hughes Steam Pump Co., Cleveland, O 2
Goulds Manufacturing Co., Seneca Falls, N. Y 10
Laidlaw & Dunn Co., Cincinnati, O 18

Pumps (Chain)—
S. E. Crawford, Norwalk, O 19

Pig and Bar Iron—
Condit, Fuller & Co., Cleveland, O 10
Cleveland Rolling Mill Co., Cleveland, O 10
W. F. Jarvis & Co., Detroit, Mich 10
Hussey & Pomeroy, Cleveland, O 10

Paint—
Iron Clad Paint Co., Cleveland, O 17

Railway Supplies—
Bowler & Co., Cleveland, O ..... 10 & 17
Cleveland City Forge & Iron Co., Cleveland, O 1
Cleveland Wheel & Foundry Works, Cleveland, O 18

Railroads—
Time Tables, etc 16

Steel Pens—
Ivison, Blakeman, Taylor & Co., New York. 19

Signs—
Weber & Lind Sign Works, Cleveland, O 19

Safes and Locks—
National Safe & Lock Co., Cleveland, O 20

Stoves—
Taplin, Rice & Co., Akron, O 10
Cleveland Co-Operative Stove Co., Cleveland, O 17

Steam Boiler Inspectors—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Ct 2

Steel Rails, Blooms and Billets—
Cleveland Rolling Mill Co., Cleveland, O 10
W. F. Thornton, Cleveland, O 10

Saw Filers—
R. J. Schaeffer & Co., Dayton, O 2

Safety Water Columns—
Reliance Gauge Co., Cleveland, O 2

Saws—
E. C. Atkins & Co., Indianapolis, Ind 1

Steel Stamps and Stencils—
J. H. Fleharty & Co., Cleveland, O 10

Sheet Iron—
Cleveland Rolling Mill Co., Cleveland, O 10
Summers Bros., Struthers, O 10

Saw Vises—
E. C. Stearns & Co., Syracuse, N. Y 10

Steel Castings—
Chester Steel Casting Co., Philadelphia, Pa. 19

Steam Fitters' Supplies—
Worswick Manufacturing Co., Cleveland, O 19

Steel Foot Rules—
Cleveland Printing & Publishing Co., Cleveland, O 12

Tool Holders—
Walker Manufacturing Co., Cleveland, O 10

Tin Cans—
W. S. Isham, Hinckley, O 10

Turnbuckles—
Cleveland City Forge & Iron Co, Cleveland, O 1

Washing Machines—
Horton Manu'f'g Co., Ft. Wayne, Ind 19

Wire Goods—
F. Powell & Co., Toledo, O 1
W. S. Tyler Wire Goods Co., Cleveland, O 2

Wood-Working Machinery—
J. S. Graham & Co., Rochester, N. Y 10

Wire Machinery—
John Adt & Son, New Haven, Ct 14

Classified List of Advertisers.

A
Andrews, Hitchcock & Co., Cleveland 10
Ætna Machine Co., Warren, O 18
Armstrong, W. C. & Co., Springfield, O 19
American Manufacturing, Mining & Milling Co., Cleveland 20
Atkins, E. C. & Co., Indianapolis, Ind 1
Adt, John & Son, New Haven, Conn 14

B
Buckey Bridge & Boiler Works, Cleveland 10
Bowler & Co., Cleveland 17
Bingham, Wm. & Co., Cleveland ..... 10 & 19
Bickford Drill Co., Cincinnati, O 1

C
Colwell & Collins Norway Bolt Co., Cleveland. 10
City Boiler Works, Columbus, O 10
Caulfield, John T., Richmond, Ind 12
Cleveland Ptg & Pub'g Co., Cleveland ..... 2 & 14
Cleveland Wheel & Foundry Works, Cleveland. 18
Canton Well Driller Co., Canton, O 14
Chapman, G. L., Alliance, O 10
Cooper, C. & G. Co., Mt. Vernon, O 19
Crescent Manufacturing Co., Cleveland 14
Curry & Co., Meadville, Pa 10
Cleveland Foundry Co., Cleveland 18
Cleveland Facing Mill, Cleveland 10
Cleveland Flue Cleaner Co., Cleveland 14
Cambridge Iron Roofing Co., Cambridge, O. 18
Collins, H. E. & Co. Pittsburgh, Pa 10
Cleveland Iron Mining Co., Cleveland, ... 10
Crawford, S. E., Norwalk, O 19
Condit, Fuller & Co., Cleveland 10
Cleveland Rolling Mill Co, Cleveland 10
Cleveland City Forge & Iron Co., Cleveland 1
Cleveland Co-operative Stove Co., Cleveland. 17
Chester Steel Casting Co., Chester, Pa 19

D
Dalliba, Corrigan & Co., Cleveland 10
Daus, Felix F. & Co., New York 12

E
Enterprise Boiler Co., Youngstown, O 20
Eclipse Electrotype & Engraving Co., Cleveland 10
Eberhardt Manufacturing Co., Cleveland 10

F
Frey, Sheckler & Hoover, Bucyrus, O 18
Fay Manufacturing Co., Elyria, O 2
Forest City Wire & Iron Works, Cleveland 1
Fitz immons, Wm. & Son, Cleveland 10
Fabric Fire Hose Co., New York 2
Fisher & Wilson Co., Cleveland 18
Ford, Geo. A., Cleveland 10
Fisher, H. T., Cleveland 19
Fleharty, J. H. & Co., Cleveland 10

G
Gump, A. W. & Co., Dayton, O 19
Garry Iron Roofing Co. Cleveland 18
Gage Machine Works, Waterford, N. Y 19
Gould E. & Eberhardt, Newark, N. J 2
Graves, L. S. & Co., Rochester, N. Y 2
Gleason, Wm. Rochester, N. Y 10
Garvin, E. E. & Co., New York 19
Goulds Manufacturing Co., Seneca Falls, N.Y. 10
Graham, J. S. & Co., Rochester, N. Y 10

H
Hotchkiss & Upson Co., Cleveland 10
Hercules Powder Co., Cleveland 12
Hoppes Manufacturing Co., Springfield, O 20
Harmon, Gibbs & Co., Corry, Pa 10
Hughes Bros. Steam Pump Co., Cleveland 2
Hussey & Pomeroy, Cleveland 10
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn 2
Horton Manufacturing Co., Ft. Wayne, Ind 19

I
Industry File Works, Cleveland 10
Iron Clad Paint Co., Cleveland 17
Ivison, Blakeman, Taylor & Co., New York. 19
Isham, W. S., Hinkley, O 10

J
Jarvis, W. F. & Co., Detroit, Mich 10
Jones, E. H. & Co., Cleveland 1

K
Kilby Manufacturing Co., Cleveland 1
Kranz, Fred, Sandusky, O 19

L
Leggett, M. D. & L. L., Cleveland 1
Lane, Bodley & Co., Cincinnati, O 20
Lodge, Davis & Co., Cincinnati, O 19
Laughlin, Alex. & Co., Cleveland 10
Lloyd & Griffith, Erie, Pa 19
Laidlaw & Dunn, Cincinnati, O 18
Leonard & McCoy, New York 14

M
McNeil, J. C. Co., Akron, O 10
Mansfield Steam Boiler Works, Mansfield, O. 10
McNutt, C. J., Ashtabula, O 20
McMyler Manufacturing Co., Cleveland 18
Mugler & Kraus, Cleveland 19
Morton Manufacturing Co., Romeo, Mich 10
Martin & Barris, Cleveland 10
Muller Machine Co., Cincinnati, O 1
Machinery Manufacturers' Association, Cleveland 1
McGowan, John H. Co., Cincinnati, O 2

N
Niles Boiler Works, Niles, O 20
Novelty Iron Works, Canton, O 10
National Safe & Lock Co, Cleveland 20

O
Outhwaite, J. H. & Co., Cleveland 10
Osborne, J. A., Cleveland 2

P
Pittsburgh & Wheeling Coal Co., Cleveland 10
Phœnix Iron Works, Cleveland 12
Powell, F. & Co., Toledo, O 1
Pope, E. C., Cleveland 10
Pickands, Mather & Co., Cleveland 10
Presley, C. H., & Co., Cleveland 18

R
Reeves Bros., Niles, O 10
Rainey, W. J., Cleveland 10
Reynolds Bros., Columbus, O 1
Rochester Machine Tool Works, Rochester, N. Y 2
Reliance Gauge Co., Cleveland 2

S
Sword, P. L. & Son, Cleveland 18
Smith & Teachout, Cleveland ..... 10 & 20
Sharon Boiler Works, Sharon, Pa 2
Schleicher, Schumm & Co., Philadelphia, Pa. and Chicago, Ill 19
Stilwell & Bierce Manufacturing Co., Dayton, O 1
Sykes Iron Roofing Co., Niles, O 12
Sebastian, May & Co., Cincinnati, O 19
Shepard, H. L., Cincinnati, O 19
Sanger, A. J., Cleveland 10
Schaeffer, R. J. & Co., Dayton, O 2
Summers Bros. & Co., Struthers, O 10
Stearns E. C. & Co., Syracuse, N. Y 10
Springfield Glue & Emery Wheel Co., Springfield, Mass 12

T
Tod, Wm. & Co., Youngstown, O 20
Taylor & Boggis Foundry Co., Cleveland 10
Tuttle, Oglebay & Co., Cleveland 10
Taplin, Rice & Co., Akron, O 10
Thornton, W. F., Cleveland 10
Tyler, W. S. Wire Goods Co., Cleveland 2

U
Universal Radial Drill Co., Cincinnati, O 1
Union Electrotype Foundry, Cleveland 14

W
Weston, J. A. & Co., Syracuse, N. Y 10
Witherow, J. P., Pittsburgh, Pa 2
Webster, Camp & Lane Machine Co., Akron, O. 10
Weber & Lind, Cleveland 19
Worswick Manufacturing Co., Cleveland 19
Walker Manufacturing Co., Cleveland 10

Y
Young & Locke, Titusville, Pa 2

Z
Zucker & Levett Chemical Co., New York 12

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A 6"x10" SELF-INKING Foot Power Printing Press; will do good work. Address J. M., care Iron Trade Review, Cleveland, O. tf

For Sale.

ONE OF DUNN'S HOISTING MACHINES, with over 40 feet of chain. Good as new; capacity, 600 lbs. Address Dunn, care Iron Trade Review, Cleveland, O. tf

Furnace for Sale.

A GOOD Charcoal Iron Furnace, in Michigan For particulars address E. C. Pope, 31 and 2 Wilshire Building, Cleveland, O. tf

For Sale Cheap.

A NEW No. 4 INJECTOR, never been used. Address Jones, care Iron Trade Review, Cleveland, O. tf

For Sale.

WE HAVE RECENTLY PURCHASED the Cleveland Iron Co.'s Rolling Mill plant on Carter street, and have for sale any or all the appliances belonging to the same. Favorable prices will be made to purchasers.
CLEVELAND ROLLING MILL CO.,
Room 12, Nat'l Bank B'ld'g,
Cleveland, Ohio.
Please mention this paper. 12tf

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We guarantee our A. & D. Flue Cleaners to give Steam the most perfect spiral motion entire length of tubes, and do the best work.
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24 CLEVELAND, O.

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To Steam Engine Builders, Shop Rights and Licenses to Build and Sell the

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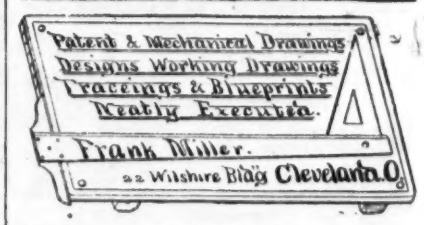

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Locks, Bolts, etc.

P. & F. Corbear, Locks & Bronze Goods.

Door locks, knobs and latches.....dis 60
Escutcheons and keys .....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60
Lever bell pulls, genuine bronze.....dis 60&10
Butts, genuine bronze.....dis 60&10
Butts, bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges & flaps genuine bronze....dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze .....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull genuine bronze.....dis 66⅔
Letter box plates, genuine bronze.....dis 60&10
Barn door locks .....dis 33⅓

Lemon Squeezers.

Porcelain lined.....℔ doz $6 00, dis 25&35
Wood.....℔ doz $3 00. dis 35
The "Boss".....℔ doz $2.50
Dean's No. 1. ℔ doz $6 50: 2. $3 25;3, $1 90....dis
Little giant.....dis 50

Lines.

Cotton Chalk.....dis 40
Silver Lake, Braided, No. 0, $6.00; No. 1. $6.50; No. 2, $7.00; No. 3, $7.50 ℔ gross .....dis 25
Masons' Linen.....dis 40
Wire Clothes, No 18, $3.75; No 19, $3.25; No. 20 $2.75;.....

Mallets.

Hickory .....dis 20&10
Lignumvitæ.....dis 20&10
Penfield Block Co., Lignumvitæ and Hickory.....dis 30

Mattocks.

Regular list..... dis 60@60&5

Meat Cutters.

Dixon's (P.S.&W.)	1	2	3	4	
℔ doz.	$14.00	$17.00	$19.00	$30.00	dis 40
Draw Cut Nos.	5	2	6	8	10
Each.....	$50.00	$75.00	$80.00	$225.00	400.00

dis 20@25

Woodruff's (P S & W) per doz No 100 $15 No 150 $18dis 45

Hale's—Nos. 11 12 13 $27 $33 $45 dis 70

Enterprise.....dis 33⅓

Mincing Knives.

Am. (2d quality), ℔ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18.....net
Smith's, ℔ doz. single, $4 50; double, $6 50 dis 40

Money Drawers.

Tucker's ℔ doz.....$18 @20

Molasses Gates.

Stebbins' pat ..... dis 70
Stebbins' genuine ..... dis 66⅔&10
Stebbins' tinned ends.....dis 40&10
Lincoln's pattern.....dis 66⅔&10
Scoville.....$7 45&10

Nails (wire).

List July 14 1887.....dis 70
Standard Penny Nails, ℔ keg card rate
{ Car lots.....$2 60
{ Less than car lots, $2 70

Nuts and Washers.

Size of bolt in.....	¼	5-16	⅜	½	⅝	¾	1
Square.....	8	7	5½	4¼	4	3¾	3¼
Hexagon.....	15½	11½	8¼	6	5¾	5¼	5
Washers.....	9	8	7	5	4½	4¼	4¼

In lots less than 100 lbs, ℔ lb add ½c, 1lb boxes add 1c to list

Nut Crackers.

Table (Humason & Beckley Mfg. Co.).....dis 40
Blake's pattern.....℔ doz. $2 00, dis 10
Quakenbush.....$5 00 net

Oakum.

Government.....℔ lb 8 c
U. S. Navy.....℔ lb 7½c
Navy .....℔ lb 6½c

Oilers.

Zinc and Tin.....new list dis 60&10
Brass and Copper.....new list dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ℔ doz.....dis 10@ 10&10

Packing, Steam.

Boston Belting Co ..... dis 60
American Packing.....10@11c
Russia Packing.....16c
Italian Packing.....16c

Pencils.

Faber's Carpenters' .....high list, dis 50
Faber's Round Gilt.....℔ gro $5.25 net

Picks.

Railroad, 5 to 6 lbs.....$12 dis 60@60&5
.. .. 6 to 7 lbs..... $13 dis 60@60&5

Pinking Irons.

℔ doz ..... 65c. net

Picture Nails.

Brass head, Sargent's list..... } dis 50&10&10
Brass head, combination list.....dis 50&10
Porcelain head Sargent's list, dis.....50&10&10
Porcelain head, combination list.....dis 40&10

Plane Irons.

Sandusky Tool C ..... dis 20&10

Pliers and Nippers.

Button's Patent .....dis 40
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., $13.50; No. 4, 7 in., $21 00 ℔ Doz. .....dis 20&10@33⅓
Gas Pliers.....dis 50&10
Humason & Beckley .....dis 50
W. S. & W. Tinners' Cutting Nippers add 6 per cent. dis 10

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Post Hole and Tree Augers.

Samson Post Hole Digger..℔ doz. $36.00, dis 20&10
Eureka Diggers.....℔ doz. $15 00 @ $16.00
Champion.....per doz $9.00
Vaughan's Hollow Tube Post Hole.....$12.00 dis40

Potato Parers.

White Mountain.....℔ doz $5.00@$5.50
Antrim Combination.....℔ doz $8.00
Hoosier .....℔ doz $13.50

Pruning Hooks and Shears.

Disston's Combined Pruning Hook and Saw ℔ doz $18.00.....dis 25
Disston's Pruning Hook.....℔ doz $12.00 dis 25
Pruning Shears .....℔ doz 3.75@$4.00 net

Pulleys.

Hot House ..... discount 60&10
Japanned Screw..... discount 60&10
Brass Screw.....discount 60&10
Japanned Side.....discount 60&10
Japanned Clothes Line.....discount 60&10

Pumps.

Cistern, best makers.....dis 50@10&60
Pitcher spout, best makers...dis 60&10@60&10&10
Pitcher spout, cheaper goods... dis 70&5@70&10&5

Punches.

Saddlers' or Drive....℔ doz. good quality. 65@75c
Bemis & Call Co.'s Cast Steel Drive.....dis 50&5
Bemis & Call Co.'s Springfield Socket.....dis 50&5
Solid Tinners.....℔ doz. $1.44, dis 55

Rails.

Sliding Door, Wrought Brass.....℔ lb 35c dis 20
Sliding Door, Iron, Painted... ℔ foot 6c dis 40&10

Rakes.

Cast Steel..... dis 65&5
Malleable..... dis 65&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher..... $10 @£....dis 10
Rifle Razor.....$9 50 net

Rivets.

Iron, Thousand, list November 17 .....dis 50
Iron, Ordinary, Cooper's Block and Carriage, list November 17.....dis 50
Copper .....dis 50

Rods.

Stair. Brass.....dis 25&2

Rollers.

Barn door, Sargent's list, ... dis 60&10&10
Acme (Anti-Friction).....dis 55

Rope.

Manilla. ½ inch and over.....11½c
Sisal, ½ inch and over.....11c

Rules.

Boxwood..... discount 80@80&10

Sad Iron.

From 4 to 10 lbs.....per 100 lbs 3c
Self-heating.....℔ doz $9 net
Self-Heating, Tailor's.....℔ doz $18 net
Mrs. Potts's Irons, ... dis 40&10
Enterprise Star Irons.....discount 40&10

Sash Weights

Per ton .....$22.50@$25.00

Saws.

Disston's Circular..... discount 45
Disston's hand panel, rip &c..... discount 25
W. M. & C., Champion Regular.....per foot 23c
W. M. & C., " Thin Back.....℔ ft 24c

Saw Frames.

White, Vermont.....℔ gross $12 00
Red, polished & varnished ℔ doz $1.50, ...dis 25

Saw Sets.

Aiken's Genuine.....$13.00, dis 50 &10
Morrill Saw Sets No. 1 $15.00; No. 3 and 4 $24.00 .....dis 40 &10

Scales.

Hatch, Counter, No. 171 .....℔ doz $21.00
Hatch, Tea, No. 161.....℔ doz $6.75@7 00
Chatillon's Grocers .....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882 dis 50&10

Scrapers.

Adjustable Box Scraper (S. R. & L. Co.) $6.50.....dis 30&10
Box, 1 Handle.....℔ doz $4.00, dis 10
Foot.....dis 50&10

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles dis 65&10
Stanley R. & L. Co.'s Black Handles.....dis 60&10
Sets Interchangeable.....℔ doz $18.00 dis 25

Screws.

Wood Screws—List Jan 27, 1885.

Flat head iron	dis 70	Extra .....10 often given
Round head iron	dis 65	
Flat head brass	dis 65	
Round head brass	dis 60	
Flat head bronze	65	
Round head bronze	60	
Machine, flat head, iron	dis 55	
Machine, round head, iron	50	
Bench and hand—		
Bench, iron	25&10	
Bench, wood, beech, per dozen	$2.25	
Bench, wood, hickory	20 & 10	
Hand, wood	20&10	
Lag or coach	dis 66⅔@70	
Coach, patent gimlet point	66⅔@66⅔&5	
Bed	25&5	
Hand rail,	66⅔&10	

Saw Tools.

Atkins' patent.....℔ doz sets $6 00

Shears.

American (Cast) Iron.....dis 75&10
Pruning .....See Pruning Hooks and Shears
Garnard's Lamp Trimmers.....℔ doz $4.00
Tinners'.....dis 20&2
Seymours List, Dec. 1881..... dis 60 &10&5
Seymours Tailor's Shears.....dis 33⅓

Scroll Saws.

Lester, complete, $10.00..... dis 25
Rogers, complete, $4.00. .....dis 25

Sheaves.

Sliding Door R. & E. list Dec 18, 1885... dis 55&2
Sliding Door, Patent Roller.....dis 60&10&2
Sliding Door, Pat'nt Roller, Hatfield's..... dis 70
Sliding Door, Corbin's Anti-Friction Dec. 18, 1885 dis 60&2

Ship Tools.

L. & I. J. White.....dis 20 & 5

Shovels and Tongs.

Iron Head.....50&10&5
Brass Head.....50

Sieves.

Metallic, new list.....dis 60&10
Flour sifters { Victor..... $2 00
Flour sifters { Hunter..... $2 25
Flour sifters { Comet..... $1 25

Slates.

School, by case..... dis 50&5@50&10

Spoke Shaves.

Iron.....dis 30
Wood .....dis 30

Spoke Trimmers.

Bonney's.....℔ doz $10.00 dis 50
Stearns'.....℔ doz $9.00 dis 20&10

Spoons.

Basting Spoons ..... dis 70&10
Britannia. .....dis 50
Rogers Bros. .....dis 50&10

Squares.

Steel and iron ..... } dis 70@10&75
Nickel plated..... }
Disston's try square and T bevels ..... dis 45
Winterbottom's try and miter.....dis 30&10

Steelyards.

dis 40&10@50

Stocks and Dies.

Blacksmith's .....dis 35
"Lightning" screw plate .....dis 15

Stone.

Hindostan, No. 1, 6c; Axe, 4½c; Slips 9c
Washita Stone .....No. 1, ℔ lb 20
Turkey Oil Stone.....4 to 3 in.....℔ lb 40c
Turkey Slips.....$1.00@1.50
Washita Slips No 1 .....℔ lb 37@38
Washita No 2 stone.....℔ lb 15c
Arkansas Stone 2.00

Stove Boards.

Zinc.....70
Oxidized.....45

Shovels and Spades.

Ames' list Nov 1 1885..... discount 20
Dennis.....8.50
Hussey & Binns, rail road 8.00

Stove Polish.

Joseph Dixon's.....℔ gross $6 00 dis 10
Gem .....℔ gross 4 50 dis 10
Gold medal.....℔ gross 6 00 dis 25
Rising Sun.....℔ gross $5 50 net
Dixon's plumbago .....℔ lb 8c. net

Trowels.

Lothrops' Brick and Plastering.....dis 25
Reed's Brick and Plastering.....dis 25
Disston's Brick and Plastering.....dis 25
Brade's brick.....dis 20

Tacks, Brads, &c.

New List, September 1, 1882. & Supplement Jan. 1, 1886.

American iron carpet tacks all kinds dis..72½&10
Steel carpet tacks all kinds..... 72½&10
Swedes Iron carpet tacks all kinds ..... 72½&10
Swedes iron tacks.....67½&10
Swedes iron Upholsterers' tacks.....67½&10
Tinned Swedes iron tacks.....67½&10
inned Swedes iron Upholsterers' tacks ....67½&10
American iron cut tacks .....70&10
Copper tacks .....33½&10
Copper finishing and trunk nails.....33½&10
Cigar box nails .....45&10
Finishing nails. .....60&10
Hungarian nails and miners' tacks.....60&10
Gimp and lace tacks.....67½&10
" " " tinned.....67½&10
Trunk and clout nails.....60&10
Tinned trunk and clout nails.....60&10
Basket nails.....60&10
Chair nails .....60&10
Common and patent brads.....60&10
Tinned capped trunk nails.....60&10

Tinware.

Stamped, Japaned & Pieced. list Jan 20. 1887..... .....dis 70&10

Tobacco Cutters.

Enterprise Mfg. Co (Champion).....dis 20&10@30

Traps.

Game, Newhouse.....dis 35
Victor.....60&10
Wood, mouse.....15c ℔ doz holes
Delusion, mouse.....℔ gross $18 00 dis 15

Trammel Lifters.

Wollensak's Patent..... dis 50

Twine.

	BC.	P.
No. 12, Flax Twine, ¼ and ½ lb Balls...	21½c	27c
No. 18, " " ¼ and ½ "	21½c	27c
No. 36, " " ¼ and ½ "	20c	25c
2-Ply Hemp, ¼ and ½ lb Balls (Spring Twine)	17	
3-Ply " 1 lb Balls.....	17½c	
3-Ply " 1¼ lb Balls	16c	
Cotton Wrapping, 5 Balls to lb.....	15@16c	

Vises.

Solid box.....50&10&5@60
Parker's.....discount 20@25
Prentiss..... " 20 &5@25
Stephen's..... " 25
Saw Filers, Wentworth's .....dis 20&10
Saw filers, Stearn's .....33⅓&10

Washer Cutters.

Smith's Patent .....℔ doz $12 00, dis 20&10&10
Johnson's.....℔ doz $11 00, dis 33⅓
Penny's.....℔ doz Pol. $14 00; Jap'd. $16 00, dis 55
Appleton's.....℔ doz $16 00, dis 60&10
Bonney's.....dis 30&10

Well Wheels.

8 in., $2.00; 10 in., $2.50; 12 in., $3.25

Wire.

New List Jan. 18. 1884

Brass and Copper.....discount 20
Bright and annealed, Nos. 0 @18 ... dis 70&5@72½
" " Nos. 19 @ 26.....dis 72½@75
" " Nos. 27 @ 36 dis 75@75&10
Coppered Nos. 0 to 18, market list.....dis 65&10@70
Galvanized Nos. 0 to 18 " " dis 60&7½@65
Tinned market Nos. 0 to 18..... dis 65
Cast steel ..... dis 50
Tinned Broom Wire.....dis 70@72½
Annealed Fence, Nos. 8 and 9..... dis 75
Annealed Grape, Nos. 10 to 14..... dis 75
Stubs Steel Wire regular.....$6 00 @ lb dis 30

Wrenches.

Coe's genuine, cash in 10 days..... 55 & 3
Girard Standard.....discount 70&10
Agricultural.....discount 75&10
Mechanics' .....dis 55&10 & 3
Bemus & Call's Combination..... 25&10
Donohue's Engineers'.....25

TINNERS' STOCK.

Tin.

Banca ..... } Market excited and advancing. Quotations only on application.
Straits ..... }
English ..... }
Bar..... }

Spelter.

American, cash, ℔ lb.....

Charcoal Tin Plate.

IC 12x12 225 sheets..... $6 00@6 50
IX 14x20 112 sheets..... 7 25@8 00
IC 10x14 225 sheets.....℔ box 5 75@6 25
IC 20x28 112 sheets..... 12 25@14 00
IX 10x14 225 sheets ..... 7 25@8 00
IX 12x12 225 sheets ..... 7 75@8 25
For each additional X add $1.00@3.00

Coke Tin Plate.

	Best	Ordinary
IC 10x14 } IC 14x20 }	$5 60	

Solder.

Half and Half, in bars warranted } Quotations only
No. 1, Refined..... } application.
Bingham..... }

Zinc.

In c. cask.....6¼
In c. open.....6¾

LEAD.

Pig.....5
Bar. ℔ lb.....6
Pipe. ℔ lb.....6½c. net
Sheet. ℔ lb.....6 net
Chilled Shot ℔ bag 25 lbs 1 35

BABBIT METAL.

No. 4.....6
Allens.....9¼
Excelsior.....15
W. B. Genuine.....25

COPPER.

Lake Ingot..... 17
Arizona..... 15¾

IRON AND STEEL.

Flat Bar

1½ to 4 by ⅜ to 1 inch.....1 85
4¼ to 6 by ⅜ to 1 inch.....1 95
1½ to 6 by 1¼ to 2 inch.....2 25
1¼ & 1⅜ by ⅜ to ¾.....1 95
1 & 1⅛ by ⅜ to ¾.....1 95
⅝, ¾ and ⅞ by ⅜ to ⅝.....2 35

Round and Square.

1 to 1⅜ inch.....1 85
2 to 2⅜ 2 05
2¼ to 3¼ inches..... 2 35
3⅜ to 4 ..... 2 85
4¼ to 4½ 3 35
4¾ to 5 ..... 3 55

Oval.

⅜ to 1¼ inch.....2 25
⅜ to ¾ 2 45
½ 2 65
⅝ 3 05

Half Oval and Half Round.

1¼ to 3 inch.....2 95
⅜ to 1¼ 2 55
⅜ to ¾ 3 05
½ 3 35
⅝ 4 85

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch..... 2 05
1 to 1⅜ by ⅛ and 5-16 inch..... 2 15
¾ to ⅞ by ¼ and 5-16 inch..... 2 35
⅛ to ⅝ by ¼ and 5-16 inch..... 2 85

Hoops.

1¼ to 4, Nos. 13 to 15..... 2 65
1¼ to 2, Nos. 16 to 18..... 2 75
1¼ to 2, No. 19..... 2 85
1¼ to 2, No. 20..... 2 95
1¼ to 2, No. 21..... 3 05
1¼ to 2, No. 22..... 3 15
15-16, 1 and 1⅛, Nos. 13 to 15..... 2 85
15-16, 1 and 1⅛, Nos. 18 to 18..... 2 95
15-16, 1 and ⅞, Nos. 19 and 20..... 3 05
15-16, 1 and 1⅛, No. 21..... 3 15
15-16, 1 and 1⅛, No. 22..... 3 35
⅞, Nos. 13 to 15..... 3 05
⅞, Nos. 16 to 18..... 3 15
⅞, Nos. 19 and 20..... 3 25
⅞, No. 21..... 3 35
⅞, No. 22..... 3 45
13-16, Nos. 13 to 15..... 3 25
13-16, Nos. 16 to 18..... 3 35
13-16, Nos. 19 and 20..... 3 45
13-16, No. 21..... 3 55
13-16, No. 22..... 3 65
¾, Nos. 13 to 15..... 3 65
¾, Nos. 16 to 18..... 3 75
¾, Nos. 19 and 20..... 3 85
¾, No. 21..... 3 95
¾, No. 22..... 3 95
11-16, Nos. 13 to 15..... 3 55
11-16, Nos. 16 to 18 ..... 3 65
11-16, Nos. 19 and 20..... 3 75
11-16, No. 21..... 3 85
11-16, No, 22 ..... 3 95
⅝, Nos. 13 to 15..... 3 85
⅝, Nos. 16 to 18..... 3 95
⅝, Nos. 19 and 20..... 4 05
⅝, No. 21..... 4 15
⅝, No 22..... 4 25
⅝, No 23..... 4 35

Light Band

1¼ to 6 by ¼ to 3-16 in 2 35
1¼ to 6 by Nos 11 and 12..... 2 45
1 to 1⅜ by ¼ to 3-16 in..... 2 45
1 to 1⅜ by Nos. 11 and 12..... 2 55
⅞ and 13-16 by ¼ to 3-16 in..... 2 75
⅞ and 13-16 by Nos. 11 and 12..... 2 85
¾ and 11-16 by ¼ to 3-16 in..... 3 05
¾ and 11-16 by Nos. 11 and 12..... 3 15
⅝ and 9-16 by ¼ to 3-16 in 3 35
⅝ and 9-16 by Nos. 11 and 12..... 3 40
½ by ¼ to 3-16 in..... 3 60
½ by Nos. 11 a d 12..... 3 70

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12..... 2 85
⅞ inch, " " " 13 and 14..... 3 15
⅞ inch, " " " 11 and 12 ..... 3 15
¾ inch, " " " 13 and 14..... 3 35

Sheet Iron.

No. 13 to 14..... 2 55
No. 15 to 17..... 2 75
No. 18 to 21..... 2 95
No. 22 to 24..... 2 95
No. 25 to 26..... 3 05
No. 27..... 3 15
No. 28 ..... 3 35

Iron Boiler Plates.

Tank, ¼ inch and heavier..... 2 45
C No. 1, " 2 70
C H No. 1, " 2 95
C H Flange, " 3 65
Extra Flange, " 4 05
Solid Fire Box, " 4 95

Steel Boiler Plates—1-4 in. and heavier.

Tank $2 55
Shell $3 05
Flange..... $3 30
Marine Flange..... $3 80
Fire Box..... $4 45

Above includes plates 90 inches wide.
90 to 96 in. wide..... ½c. ℔ extra.
96 to 100 in. wide..... 1 c. "
100 to 104 in. wide..... 1½c. "
104 to 116 in. wide..... special.

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔
to 2 in. inclusive	09
9-16 to ½ in. "	09
7-16 to ⅝ and 2⅛ to 3 in.	10½
3⅛ to 4 in.	10
⅝ to 11-16 an 4⅛	11½

TRAVELER'S REGISTER.

Standard Time.
Revised March 6th, 1888.

N. Y. C. & St. L. R. R. Co.—"The Nickel Plate."

EASTWARD.	ARRIVE.	DEPART
Buffalo Passenger	10 40 a m	10 45 a m
Chicago Passenger	9 20 p m	.....
Local Freight	4 40 p m	5 45 a m
WESTWARD.	ARRIVE.	DEPART.
Chicago Passenger		6 30 a m
Fostoria Passenger	4 46 p m	4 51 p m
Local Freight	5 20 p m	5 50 a m

Rocky River Accommodation departs 7:40 a. m.; 1:40 p. m.
Euclid Accommodation departs 6:24 a. m. 12:10 a. m., 5:05 p. m.
All trains daily, except Sunday.

Cleveland & Pittsburg.

	ARRIVE.	DEPART.
New York Express	12 45 p m	7 45 a m
New York Express	6 55 p m	1 40 p m
Alliance & Akron Accom.	9 35 a m	3 25 p m
Ravenna Accommodation	8 25 a m	5 00 p m
Night Express	* 5 25 a m	*11 10 p m

*Daily; all other trains daily except Sunday.

Mt. Vernon & Pan Handle Route

C., A. & C. Ry. Co.	ARRIVE.	DEPART.
Akron, Col. & Cin. "Flyer"	5 40 p m	8 10 a m
Akron, Col. & Cin. Night Express	7 30 a m	8 00 p m
Akron & Columbus Exp.	12 45 p m	1 40 p m
Akron & Orrville Accom.	9 35 a m	3 25 p m

The 8 p. m. train runs daily. Elegant Pullman palace sleeping cars attached. All other trains daily except Sunday.

Erie Railway.
Depot. South Water St. and Viaduct.

	ARRIVE.	DEPART.
N. Y. & Pitts. Express	15 38 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommodation		†6 40 a m
Pittsburgh Express	† 6 25 p m	
Youngstown Local	†8 05 a m	
Mahoning div. and Pitts Local		*11 40 a m
Mahoning Val Accom.		*4 30 p m
Pittsburgh Express	†1 20 p m	11 10 p m
New York Express	*8 00 p m	

* Daily. † Daily except Sunday. ‡ Daily except Monday.

Lake Shore & Michigan Southern Railroad.

TRAINS GOING EAST.	Arrive from West.	Depart East.
No. 4, Fast Limited Ex	2 55 a m	*2 55 a m
No. 6, N. Y. & Bos. Ex.	*1 35 a m	*1 40 a m
No. 8, N. Y. B't'd & At Ex	*8 25 a m	*8 50 a m
No. 26, Elyria Accom.	†7 45 a m	
No. 10, Toledo & Sandusky Accommodation	†1 05 a m	
No. 24, Buffalo Accom.		†7 00 a m
No. 10, N. Y. & Boston "Flyer,"		*11 50 a m
No. 12, N. Y. & Bos. Ex.	*2 35 p m	*3 00 p m
No. 2, Night Express	†9 40 p m	†10 00 p m
No 26, Conneaut Accom.		†4 25 p m
TRAINS GOING WEST.	Arrive from East.	Depart West.
No. 1, Fast Limited Ex.	*12 15 a m	*12 15 a m
No. 23, Cleveland Express	*2 15 a m	
No. 3, Chi. Ex. via Sand'y.	15 30 a m	†5 45 a m
No. 25, Mich. Ac. via Norw'k		†5 45 a m
No. 21, Toledo Ex. via Norwalk and Sandusky	†12 50 p m	†3 20 p m
No. 5, Fast St. Louis & Chicago Ex. via Sandusky	*10 50 a m	*10 55 a m
No. 9 hi. Pac. Ex. via Nor'k	*6 55 p m	*7 15 p m
No. 31, Elyria Accommodation, to Elyria only		†4 30 p m
No. 27, Conneaut Accom.	†8 10 a m	

Sunday train for Nottingham— Depart 8:15 a. m. and 1:00 p. m.; arrive 9:20 a. m. and 4:45 p m.
Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.
A local Cleveland and New York Sleeper and dining car daily on No. 10, leaving Cleveland at 11:50 a. m., arrives Grand Central Depot, New York 7:30 a. m.
For further information as to trains, connections and sleeping car berths apply at the City Ticket Office 229 Bank St., Mercantile Bank building. Telephone 669.

M. E. GAUL, City Pass. Ag't. A. J. SMITH, Gen'l Pass. & Ticket Ag't.

Cleveland and Canton Railroad.

Arrive.—Canton, Sherrodsville and Coshocton 9 55 a.m., 7 00 p.m.
Kent —*7 50 a.m., *7 16 p.m.
Bedford—*7:50 a.m., 1:05 p.m., 7 16 p.m.
Newburgh and Miles avenue—7:10 a.m., 4:15, p.m. 5:33 p.m.
Depart—
Canton, Sher'dsville & Cosh't'n—7:00 a.m. and 3:10 p.m.
Kent—*8:38 a.m. and *8:30 p.m.
Bedford—*8:38 a.m., 4:45 p.m., 11:10 a.m., 5:45 p.m.
Newburgh and Miles Avenue—6:12 a.m., 2:00 p.m., 4:40 p.m.
Trains marked with * run daily. All others daily except Sunday.
Depot at Ontario street, one block east of Huron street

Cleveland, Lorain and Wheeling.

	DEPART.	ARRIVE.
Wheeling Express	6 45 a m	6 55 p m
Uhrichsville Express	4 00 p m	9 20 a m

Pittsburgh & Lake Erie Railroad.

On and after Jan. 2 1888, passenger trains will depart from and arrive at the Pittsburgh and Lake Erie Depot at Pittsburgh, as follows, Central time:

P. & L. E. R. R. Depart for—
No. 1, Cleveland, Bradford and East, 5 25 a.m
No. 5, Buffalo, St. Louis, Cleveland 7 45 a.m
No. 5, Beaver Falls Accommodation 8 40 a.m
No. 7, Buffalo, New York, and all New England points, 10 15 a.m
No. 9, Chicago, Cincinnati, St. Louis, 1 10 p.m
No. 11, Buffalo Express 3 30 p.m
No. 13, Beaver Falls Accommodation 5 20 p.m
No. 15, Buffalo Express 10 30 p.m

Arrive from—
No. 2 Beaver Falls Accommodation, 5 25 a.m
No. 4, Buffalo and Cleveland Night Exp. 6 55 a.m
No. 6, Youngstown Accommodation, 9 20 a.m
No 8 Beaver Falls Accommodation, 12 40 p.m
No. 10, Chicago, Cincinnati & St. Louis, 1 35 p.m
No. 12, Buffalo Express, 5 45 p.m
No. 14, Cincin., St Louis and Cleveland, 8 05 p.m
No. 14, Cleveland & Buffalo Express 10 35 p.m

Pittsburgh & Lake Erie trains Nos. 4, 15, 8 and 10 daily.

E. HOLBROOK, General Superintendent.
R. W. JONES, Master of Transportation.
A. D. SMITH, Gen'l Pass. Ag't. Pittsburgh.

WHEELING & LAKE ERIE

TIME TABLE—IN EFFECT JAN. 8, 1888,
Central Standard Time.

EASTWARD.	No. 5.	No. 7.	No. 9.*	No. 13*
Toledo.....lv	7 45 AM	1 10 PM	4 50 PM	7 45 PM
Oak Harbor...ar	8 41	2 05	5 45	10 01
Fremont	9 06	2 30	6 10	1 45
Clyde	9 22	2 47	6 25	11 15
Bellevue	9 37	3 03	6 40	11 40 PM
Monroeville..lv	9 55	3 20	6 58	3 10 AM
Norwalk	10 10	3 40	7 15	3 22
Wellington	11 00	4 32	8 08	4 00
Creston	11 53	5 20	9 05 PM	4 47
Orrville.....ar	12 20 PM	5 48	9 40 PM	5 15*
Orrville.....lv	12 40	5 53	7 05 AM	7 05
Massilon.....ar	1 20	6 35	7 52	7 52
Massilon.....lv	1 20	6 35	7 52	7 52
Navarre	1 35	6 50	8 10	8 10
Valley June..lv.	2 20	7 35	8 55	8 55
New Cumberl'd	2 23	7 48	9 10	9 10
Sherrodsville	2 45	8 00	9 25	9 25
Leesville	2 52	8 08	9 40	9 40
Bowerston....ar	2 58 PM	8 15 PM	9 50 AM	9 50 AM
Canal Dover	2 57 PM			
New Comerst'n	3 38			
Cambridge	4 35			
Macksburg	6 02			
Marietta.....ar	7 15 PM			

WESTWARD.	No. 6.	No. 8.	No. 4.	No. 2.*
Marietta.....lv	6 45 AM	2 20 PM		
Macksburg	7 56	1 30		
Cambridge	9 23	3 00		
New Comerst'n	10 23	3 58		
Canal Dover	11 04 AM	4 34 PM		
Bowerston	1 25 AM	3 45 PM	5 55 AM	
Leesville	11 32	3 55	6 02	
Sherrodsville	11 40	4 10	6 10	
New Cumberl'd	11 52	4 25	6 22	
Valley June	12 20 PM	5 02	6 45	
Navarre	12 50	5 35	7 35	
Massilon	1 05	5 50	8 00	
Orrville.....ar	1 40	6 25	8 55	
Orrville.....lv	1 45	6 35*	9 13	
Creston	2 18	7 02	9 42	
Wellington	3 05	7 43	10 33	
Norwalk	3 55	8 25	11 30	7 25 AM
Monroeville	4 07	8 35	11 45	7 35
Bellevue	4 23	9 45	11 59	7 51
Clyde	4 39	10 00	12 15 PM	8 06
Fremont	4 55	10 17	12 30	8 23
Oak Harbor	5 20		12 53	8 45
Toledo.....ar	6 20 PM	11 15*	1 50 PM	9 40 AM

No. 27	No. 25	Huron Divis'n.	No. 26	No. 28
4 50 PM	7 40 AM	Ar. Huron Lv	8 55 AM	5 30 PM
4 32	7 22	Friese Landing	9 10	5 45
4 20	7 10	Milan	9 28	6 03
Lv 3 55	Lv 6 45	Norwalk	Ar 9 55	Ar 6 30
Ar PM	Ar AM		Lv AM	Lv AM
		Monroeville		

* Daily.
Train No. 13 leaves Toledo *7 45 p. m.; arrive Monroeville 12 15 a. m. and Norwalk 12 35 a. m
This road is now open through from Toledo to Bowerston, connecting with the Pennsylvania System for all points East.

THROUGH CAR SERVICE.
Between Toledo, Cambridge and Marietta.
" " and Bowerston.
" " and Akron, Youngstown and Pittsburgh.
" Chicago, Akron, Youngstown and Pittsburgh.

M. D. WOODFORD, Gen'l Manager. JAMES M. HALL Gen'l Pass. Agt.

Scioto Valley Railway

TIME TABLE.
In effect May 27, 1888.
THE SHORT LINE TO ALL POINTS
North and South, East and Southeast, West and Northwest.

TRAINS GOING SOUTH.

STATIONS.	No. 2.	No. 4.	No. 6.
Columbus.....Lv	7 10 a.m	11 25 a.m	5 25 p.m
Valley Crossing	7 30 "	11 44 "	5 45 "
Lockbourne	7 41 "	11 53 "	5 56 "
Ashville	7 55 "	12 07 p.m	6 10 "
Circleville	8 15 "	12 26 "	6 30 "
Kingston	8 34 "	12 44 "	6 49 "
Chillicothe	9 01 "	1 30 "	7 35 "
Sharon	9 36 "	2 05 "	8 10 "
Waverly	9 46 "	2 14 "	8 20 "
Piketon	9 58 "	2 27 "	8 33 "
Big Run	10 12 "	2 41 "	8 47 "
Lucasville	10 27 "	2 57 "	9 03 "
Portsmouth	10 50 "	3 20 "	9 25 "
Sciotoville	11 05 "	3 35 "	9 40 "
Wheelersburg	11 10 "	3 40 "	9 45 "
Haverhill	11 29 "	3 59 "	10 04 "
Hanging Rock	11 40 "	4 10 "	10 15 "
Ironton	11 50 "	4 20 "	10 25 "
Petersburg	12 00 m.	4 30 "	10 35 "
Ashland.....Ar	12 30 p.m	5 00 p.m	11 05 p.m

Trains Nos. 2 and 4 daily, except Sunday.
Train No. 6 daily.
Train No. 6 takes supper at Chillicothe.

TRAINS GOING NORTH.

STATIONS.	No. 1.	No. 3.	No. 5.
Ashland.....Lv	2 45 a.m	9 05 a.m	5 35 p.m
Petersburg	3 15 "	9 35 "	6 05 "
Ironton	3 26 "	9 46 "	6 15 "
Hanging Rock	3 36 "	9 56 "	6 25 "
Haverhill	3 46 "	10 07 "	6 36 "
Wheelersburg	4 06 "	10 28 "	6 55 "
Sciotoville	4 12 "	10 33 "	7 00 "
Portsmouth	4 27 "	10 05 "	7 15 "
Lucasville	4 49 "	11 14 "	7 37 "
Big Run	5 04 "	11 32 "	7 53 "
Piketon	5 18 "	11 48 "	8 07 "
Waverly	5 30 "	12 01 p.m	8 20 "
Sharon	5 40 "	12 11 "	8 30 "
Chillicothe	6 35 "	1 10 "	9 06 "
Kingston	7 01 "	1 26 "	9 31 "
Circleville	7 20 "	1 36 "	9 49 "
Ashville	7 40 "	1 55 "	10 08 "
Lockbourne	7 55 "	2 15 "	10 22 "
Valley Crossing	8 05 "	2 39 "	10 31 "
Columbus.....Ar	8 20 a.m	3 00 p.m	10 50 p.m

Train No. 1 daily.
Trains Nos. 3 and 5 daily, except Sunday.

COUPON TICKETS, by the best routes and to all principal points in the United States and Canada, can be found at the following Stations: Columbus, Circleville, Kingston, Chillicothe Waverly, Portsmouth, Ironton, A. C. & I. Ashland.
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JNO. J. ARCHER, Gen'l Pass. & Ticket Ag't, Columbus, Ohio.

Ft. Wayne, Cincinnati & Louisville

RAILROAD.
THE POPULAR ROUTE
BETWEEN THE
NORTH and SOUTH
THE DIRECT ROUTE TO OR FROM
FORT WAYNE,
INDIANAPOLIS,
TERRE HAUTE,
EVANSVILLE,
AND ST. LOUIS.

13 MILES SHORTER 13
—BETWEEN—
Fort Wayne and Indianapolis
Than any other Route.

22 MILES SHORTER 22
AND QUICKER
By 3 HOURS, Between
Louisville and Fort Wayne.

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EAST, WEST, NORTH AND SOUTH.
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The Picturesque Lehigh Valley Route.

Two through trains with Pullman cars attached are now run via by this beautiful scenic route, between Suspension Bridge, Buffalo, New York and Philadelphia, leaving Suspension Bridge 8:35 A. M. and 3:40 P. M., Buffalo 9:15 A. M. and 5:15 P. M., connecting with all trains from the West.

Passengers between the East and West passing over the famed LEHIGH VALLEY ROAD will experience the pleasure of a trip through the most magnificent and picturesque scenery in the world, presenting an ever varying panorama of delightful surprises.

Double track, steel rails, magnificent road bed and unrivaled equipment, all combine to make the LEHIGH VALLEY the favorite and most desirable route between the East and the West.

Anthracite Coal is used entirely, guaranteeing the passengers perfect freedom from the dense volumes of smoke that so greatly annoy passengers on lines using Bituminous Coal.

E. B. BYINGTON, Gen'l Pass. Agent Bethlehem, Pa.

Expiration Registers.

MANUFACTURERS' and Dealers' Insurance Registers with special ruling for number of Policy, Company, seven spaces for amounts on different property, amount of policy, amount of premiums, time of expiration, etc., will be sent post-paid on receipt of $1.00. Or we will give one as a premium with each new subscription to the IRON TRADE REVIEW, price $3.00 per year.

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Week Days **FOR DETROIT** 9.00 P. M.

Special Sunday Night and Thursday Morning Trips, July and August.

Four Trips **For Mackinac** per Week,

and Lake Huron Way ports.

All Departures from 23 River Street.

E. B. WHITCOMB, G. P. A. T. F. NEWMAN, G. A

VALLEY RAILWAY.

Depot foot South Water Street.

	Arrive.	Depart.
Valley Junction Mail	*7 30 a m	*7 20 p m
Marietta Express	†1 00 a m	†2 50 p m
Canal Dover Express	* 4 30 p m	*10 00 a m
Akron & Cleve. Accom	* 7 45 p m	*7 45 a m

*Daily.
†Daily, except Sunday.

WM. THORNBURGH, Gen. Manager, R. A. CARRAN, Gen. Pass. Ag't,

THE FAVORITE ERIE RAILWAY AND Picturesque Route TO New York, Boston and the East.

THE SHORTEST AND QUICKEST ROUTE TO PITTSBURGH, WASHINGTON AND BALTIMORE, AND THE SOUTHEAST.

Change of time goes into effect May 20, 1888.
Central, or Ninetieth Meridian time, 33 minutes slower than Cleveland city time.
Until further notice trains will leave from the New Central Depot, South Water Street and Viaduct, as follows:

	Depart.
No. 62, Mahoning Valley Accommo	† 6 40 a m
No. 72, New York Express,	* 8 30 a m
No. 72, Fast Pittsburgh Express	* 8 30 a m
No. 64, Fast New York Express	* 3 00 p m
No. 64, Pittsburgh Express,	* 3 00 p m
No. 66, Youngstown Accommo	* 5 00 p m
No. 68, Pittsburgh Express	†11 10 p m
No. 68, New York Express	†11 10 p m
No. 70, Pittsburgh Local Express	*11 40 a m
No. 74, Shenango Valley Express	† 4 00 p m
	Arrive.
No. 73, Shenango Valley Express	† 9 23 a m
No. 61, New York Express	† 5 45 a m
No. 61, Pittsburgh Express	† 5 45 a m
No. 65, Fast New York Express	*10 55 a m
No. 65, Pittsburgh Express,	*10 55 a m
No. 67, Pittsburgh Express	† 1 20 p m
No. 63, New York Express	* 7 05 p m
No. 69, Pittsburgh Express	* 8 40 p m
No. 77, Youngstown Local	* 7 25 a m
No. 13, Erie Express, carrying express matter only, from all points East and South-east, carries no passengers (except Monday)	† 1 20 p m.

* Daily .† Daily, except Sunday.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City and intermediate points without change. No change to Boston and New England cities.

Baggage checked through to all points East.
Through tickets and information regarding the route can be obtained at office, 141 Superior street, and at Central Depot, South Water street and Viaduct, Cleveland. Ship by Erie Express.

E. B. THOMAS, 2d Vice President, Cleveland, O.
L. P. FARMER, Gen'l Pass. Agent, New York.
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M. L. FOUTS, City Passenger Agent. 141 Superior Street, Weddell House, Cleveland, O.

Cleveland & Marietta R. R.

THROUGH LINE BETWEEN
Marietta, Caldwell, Cambridge, Newcomerstown, Canal Dover, Canton, Akron, Cleveland, Buffalo, Toledo Pittsburgh, New York, Coshocton, Newark, Zanesville, Columbus, Chicago and St. Louis.

In effect April 22d, 1888.

GOING NORTH.			GOING SOUTH.	
No. 4.	No. 2.	STATIONS.	No. 1.	No. 3.
9 55 AM	2 00 AM	Parkersburg	2 45 PM	11 55 AM
12 20 PM	6 45	Marietta	10 15 AM	7 13
12 40	7 05	Caywood	9 55	6 53
12 48	7 11	Stanley	9 49	6 47
1 00	7 25	Whipple	9 35	6 32
1 10	7 35	Warner	9 25	6 22
1 23	7 48	Elba	9 12	6 06
1 30	7 55	Macksburg	9 05	6 02
1 37	8 01	Dexter City	8 58	5 55
1 41	8 05	South Olive	8 54	5 50
1 48	8 12	Dudley	8 47	5 43
1 57	8 20	Caldwell	8 40	5 36
2 07	8 30	Belle Valley	8 30	5 26
2 17	8 40	Ava	8 19	5 16
2 29	8 52	Pt. Pleasant	8 07	5 04
2 42	9 04	Byesville	7 53	4 50
3 00	9 25	Cambridge	7 36	4 35
3 07	9 32	Oldham's	7 27	4 27
3 14	9 40	Miller's	7 20	4 20
3 24	9 50	Kimbolton	7 10	4 10
3 39	10 05	Guernsey	6 56	3 55
3 47	10 12	Post Boy	6 49	3 47
3 58	10 23	N. Comerstown	6 40	3 38
4 05	10 30	Wolf's	6 31	3 29
4 17	10 43	Phillipsburg	6 20	3 17
4 22	10 48	Black Band	6 14	3 12
4 28	10 54	Turner's	6 09	3 06
4 38	11 04	Canal Dover	6 00 AM	2 57
5 00	11 27	ar. Vall'y J'n. lv		2 35
5 02	11 35	lv. Vall'y J'n. ar		2 20
	12 19 PM	Canton		1 30
	1 12	Akron		12 31
	2 35	Cleveland		11 20 A
	8 00	Buffalo		5 40
11 15 PM	6 20	Toledo		7 05

Train No. 8 leaves Marietta at 1 40 p. m. Whipple 2 40, Warner 3 00, Elba 3 20, Macksburg 3 35, Dexter City 3 47, Caldwell 4 25, arriving Cambridge 6 30 p. m. Train No. 5 leaves Valley Junction at 5 13 p. m., arriving at Canal Dover 5 35 p. m.
Through coaches on trains Nos. 2 and 3 between Marietta, Canton, Akron, Cleveland and Toledo. Close connections made at Marietta with C., W. & B., M., C. & N., Z. & O., and Ohio River Packets; at Cambridge with B. & O., east and west; at Newcomerstown with P., C. & St. L. east and West; at Canal Dover with C., L. & W and C. & P., north and east; at Valley Junction with W. & L. E. and Valley R'y.

A. T. WICKOFF, Gen. Manager. W. K. RICHARDS, Gen. Pass. Agt

½ to 6 in..	11½
¼ to 9-32 and ⅛ to 7 in	12
8-6 in	14

Flats.

	cts. lb
2 to 9-16 wide by 2 to ⅝ thick	0

Bessemer and O. H. Steel.

	cts. lb.
Machinery base price.	0 3½
Tire "	02¾
Spring "	03½
Sleigh Shoe "	02¾
Toe Calk	03
Cutter Shoes, tapered and burr	03

For extra sizes, see classification below.

Machinery Steel.

ROUNDS AND SQUARES.

	cts. per lb ex.
1 to 3 in. incl.	base
3⅛ to 4 "	0.3
4⅛ to 6 "	1.0
¾ to 15 16 "	0.2
¼ to 11-16 "	0.3
⅜ to 7-16 "	0.4
5-16 to 11-32 "	0.5
¼ and 9-32 "	0.7
Machine cutting, specified lengths, ab'e 24 in.	0.2
Machine cutting, specified lengths, 1 to 24 in.	0.4

Machine cutting to specified lengths less than 12 inches, according to contract, but not less than 0.6 cents on each size extra. Sawing, one-half of the above extra for cutting.

FLATS. cts. per lb ex.

1½ to 6 in., by 5-16 to 1 in. thick	base
1½ to 6 in., by ¼ and 9 32 in. thick	0.2
1½ to 6 in., by 3 16 and 7-32 in. thick	0.3
1½ to 6 in., by ⅛ and 5-32 in. thick	0.4
⅜ to 1 7-16 in., by ¼ to 1 in. thick	0.3
⅜ to 1 7-16 in., by 9-16 and 7-32 in. thick	0.4
⅜ to 1 7-16 in., by ⅛ and 5 32 in. thick	0.5
⅝ to 11-16 in., by ¼ to ½ in. thick	0.4
⅝ to 11-16 in., by 9-16 and 7-32 in. thick	0.6
⅝ to 11 16 in., by ⅛ and 5-32 in. thick	0.8
⅝ to ¾ in., by 1-16 and 3 32 in. thick	2.0
13-16 to 1¼ in., by 1.16 and 3- 2 in. thick	1.5
1¼ to 3 in., by 1-16 and 3-32 in. thick	1.0

These extras apply on Tire, Toe Calk, Shoe and Flat Machinery Steel, also on Cutter Shoes.

SPRING STEEL FLATS. cts. ex.

1¼ to 4 in. by No. 4 gauge to ⅛ in. inclusive,	base
1 and 1⅛ in. by No. 1 gauge to 4 gauge "	0.2
1 to 3 in by No. 5 gauge to 7 gauge "	0.5
⅞ to 3 in. by No. 8 gauge to 10 gauge "	1.0
⅝ to 3 in. by No. 11 gauge to 16 gauge "	2.0
⅝ to 3 in., by No. 17 gauge to 20 gauge "	3.5
⅜ to ⅝ in. by No. 10 gauge to 16 gauge "	4.0
⅜ to ⅝ in. by No. 17 gauge to 20 gauge "	5.0
⅜ to ⅝ in. by No. 21 gauge to 24 gauge "	6.0

Bessemer and Open Hearth cut to length, 2t nch and over 1-10 cent per lb. extra, and under, y special contract.

ROUND SPRING STEEL. cts. ex

⅝ to 1½ inches	base
¼ to 9-16 inches	0.2
⅜ to 7-16 inches	0.5
5-16 inches	1.0
¼ inches	1-5

English Tool Steel.

Jessops	16c
Hob on's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ⅜, 11-16 and ¾ inch diam	4 00

Rolls and Castings.

Furnace floor and straightening plates	1¼c
Housings and castings not otherwise specified	1¾c
Guide plates	2¼c
Spindles and coupling boxes	1¾c
Sand rolls and pinions, large size	2 c
Sand rolls and pinions, small size	2¼c
Pipe mill castings	3 c
Rolling mill castings under 50lb	2 c
Spur and bevel wheels, large	3 c
Spur and bevel wheels, small	3½c
Pulleys up to 30 inches	4 c
Pulleys over 30 inches	3½c
Engine castings, light	3¼c
Engine castings, heavy	2¾c

SCRAP IRON AND OLD METAL

	Net Ton.
No. 1 R. R. wrought scrap	$23 00
No. 1 wrought scrap	20 00
No. 1 Machine cast scrap	15 00
Stove plate (free from burnt iron)	10 50
Grate bars	11 00
Pipes and flues (Clean)	13 00
Tank iron	12 50
Hoop and band iron	10 00
Iron axles	28 00
Light sheet iron	10 00
Axle turnings	16 00
Wrought turning (free from cast)	15 00
Wrought iron, oily drillings	14 00
Cast borings	11 00
Malleable iron	10 50
Uncut wrought iron boilers	10 00
Steel boiler plates	14 50
Old iron T rails gross tons	$27 00
Old steel rails	23 00
Car wheels	20 00
Old copper per lb	7
No. 1. H. red Brass	8½
Heavy yellow brass	6½
Light yellow Brass	6
Scrap Zinc	3
Tea Lead	3
Heavy Lead	3¼

WROUGHT IRON PIPE.

DISCOUNTS.

	Discount Per Ct.
Wrought iron pipe: Butt black X str	52½
XX str	
Wrought iron pipe, Lap black X str	52½
XX str	
Wrought iron pipe: Butt galv	42½
" " Lap "	52½
Lap-welded boiler tubes	50
" drive pipe	
" casing	
Lead pipe per lb	
Sheet lead "	
Galvanized spiral pipe	50
" " fittings	30
Patent adjustable oils	40
Globe ventilators	60
Tin tubing	50
Fittings for same	30
Expanding conductor pipe and fittings	40
Cast iron piece fittings for wrought iron pipe, black and galv	70
Bushings and plugs	75

Malleable unions	65
" flange unions	72½
Long screw	70
Gas pipe hooks	50
Cast iron flanges, manifolds and expansion pipe hangers	65
Hook, ring and expansion plates, coil stands	67½
Iron body: Globe, angle, check, cross, safety, butterfly, throttle, back pressure and foot valves	65&10
Iron body: Expansion joints and iron cocks, all iron	65&10
Iron body: Iron cocks with brass plugs	60&10
Straight way valves	
Brass: Globe, angle, check, cross safety, and radiator valves	60&10
Turrottle and butterfly valves	5 &10
Brass: Fin. globe valves, with finished brass wheels	40&10
Brass: Steam, service, meter and union meter cocks	57½&10
Brass: Expansion joints and steam bibbs	50&10
Mississippi gauge cocks	55
Bingham "	50
Gas proving pumps	50
Oil cups, lubricators and air cocks	60&10
Cocks for steam gauges	60&10
Cylinder cocks	50&10
Comp. gauge cocks	55&10
Water gauges, steam whistles and whistle valves	60&10
Gas fixture fittings	55
McNamara hydrants and street washers	Spec'l
Stop cock boxes	Spec'l
Galvanized wrought iron range boilers, to 52 gallons	65
Galvanized wrought iron range boilers, larger	50
Stands for same	40
Copper bath tubs	25
Closets	Spec'l
Cast iron soil pipe, to 6 in. inclusive	60
" " fittings, to 6 in. inclusive	65
Cast iron sinks	70
" slop sinks	60
Drive-well points	50
Ground key work:	
Rough and fin. plain, tray and bath bibbs, " " stops, shower stops, hydrant and ball cocks	55&10
Compression:	
Rough and fin. plain, tray and bath bibbs	50&10
" " stops; urinal, hopper, hydrant and ball cocks	50&10
Basin cocks, from No 1 to 13 inclusive	50&10
" " above No. 13, and double basin	40&10
Shampooing and sink cocks	40&10
Pantry cocks	50&10
Shampooing sprinklers	50&10
Double bath cocks and chain stays	50&10
Hose goods, plain and water back couplings	55&10
Boiler couplings, ground face, per set net, $1.25	10
Boiler couplings plain face, per set net, $1.20	10
Basin plugs and grates; bath, sink and wash tray plugs	60&10
Soldering nipples and unions	65&10
Union joints	60&10
End ferrules; street washer screws, checks and guides	55&10
Hydrant and basin clamps, hydrant sockets	55&10
Pipe taps, reamers and dies	60
Plain pipe tongs and gas pipers	50
Wrenches: Coe	50 & 5
" Girard agricultural	65
" " standard	60 & 5
" Stillson	33⅓
" Armstrong	25 & 5
" Bemis & Call	25 & 5
" Rouse	30
" Bauer s	10
Pipe tongs: Brown's adjustable	50
" Jarecki	50
" Robbins' chain	10
" Brock's	10
Vises: Plain pipe	55
" Smith comb	50
" Parker's comb	50
" Bauer's pipe and bolt	10
Machinists' hammers	40
Copper "	Spec'l
Pipe cutters: Stanwood	20
" Eureka	45
" Saunders	40
" Barnes	50 & 5
Malleable oilers and hand lamps	Spec'l
Screwing stocks	60
Armstrong's adjustable stocks and dies	25&10
Waste, at manufacturer's prices.	
Gas fitters' cement	Spec'l
Hair felt	Spec'l
Riley Bros. cement	Spec'l
Otley Bros. steam packing	Spec'l
Mineral wool	Spec'l
Lubricating compound	Spec'l
Malleable iron fittings, black and galv	25
Wrought iron couplings and nipples, black and galv	70

Standard Wrought Iron, Steam, Gas and Water Pipe.

Nominal Size Inside Diameter.	Price per Foot, Black	Price per Foot, Galvanized	Thickness.	Nominal Weight per Foot	No. of Threads per in. of Screw	Price, Extra Threads.
In.			In.	Lbs.		
⅛	0 04	0 05	.068	0 24	27	0 05
¼	0 04	0 05	.088	0 42	18	0 05
⅜	0 04	0 05½	.091	0 56	18	0 05
½	0 05	0 07	.109	0 84	14	0 05
¾	0 07	0 09	.113	1 12	14	0 05
1	0 09½	0 12½	.134	1 67	11½	0 06
1¼	0 12½	0 17	.140	2 24	11½	0 07
1½	0 22	0 25	.145	2 68	11½	0 08
2	0 28	0 32	.154	3 61	11½	0 10
2½	0 44	0 49	.204	5 74	8	0 15
3	0 58	0 64	.217	7 54	8	0 20
3½	0 70	0 86	.226	9 00	8	0 25
4	0 85	1 00	.237	10 66	8	0 35
4½	1 00	1 25	.246	12 49	8	0 45
5	1 20	1 50	.259	14 50	8	0 55
6	1 65	2 00	.280	18 76	8	0 70
7	2 00		.301	23 27	8	0 85
8	2 75		.322	28 18	8	1 00
9	3 70		.344	33 70	8	1 20
10	4 75		.366	40 06	8	1 25
11	5 75		.377	45 02	8	1 50
12	6 50		.375	49 00	8	2 50
13	7 75		.375	54 00	8	
14	9 00		.375	58 00	8	
15	10 00		.375	62 00	8	

Extra Strong, double above list.

Double Extra Strong, double list of Extra Strong.

LAP-WELDED BOILER TUBES.

Size, Outside Diameter, inches	1	1¼	1½	2	2¼	2½	3	3¼	3½	4	4½	5	6
Price per foot	23	28	25	22	25	25	31	34	38	52	60	72	96
Price, Lap-Welded Drive Pipe	8	10	12	15	22	28	31	30	43	50	60	66	86

DRIVE PIPE SHOES.

	6"	8"	10"	12"
Long, Separate	13 00	15 00	20 10	25 00
" Shrunk on pipe	16 00	18 00	25 00	30 00
Short, Separate	14 00	14 00	17 00	22 00
" Screwed on pipe	13 00	15 00	19 00	24 00

DRIVE PIPE HEADS.

	12 00	18 00	22 00

LAP-WELDED CASING.

Size, Inside Diameter Nominal	2	2¼	2½	3	3½	4	4½	5	5 3-16	6⅝	6⅝	8⅝	8⅝	10⅜
Price per foot	25	28	31	38	43	56	64	74	86	1 06	1 30	1 45	2 10	2 25

Tarred or Asphalt and Kalamein Pipe, list and discount furnished on application.

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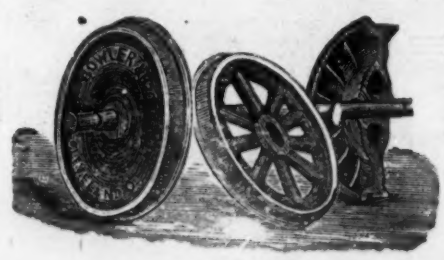

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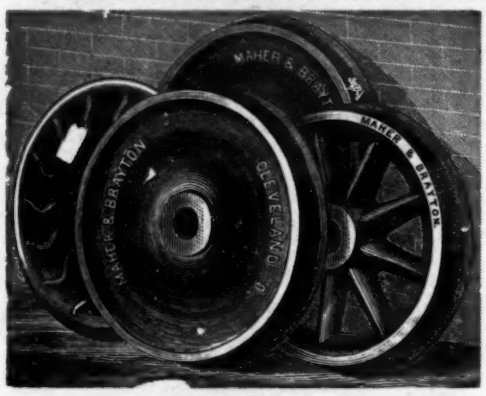

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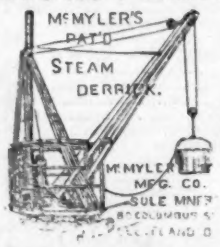

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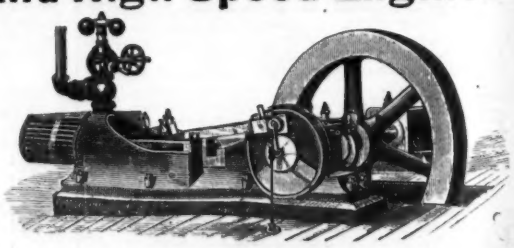

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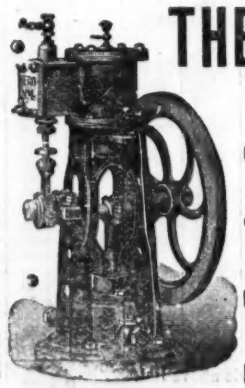

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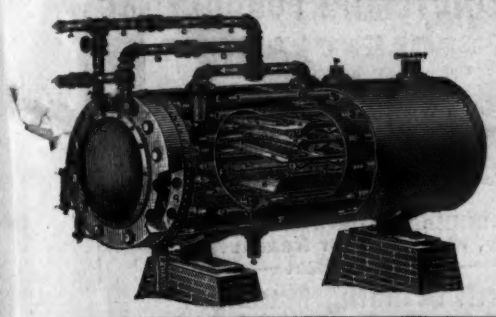

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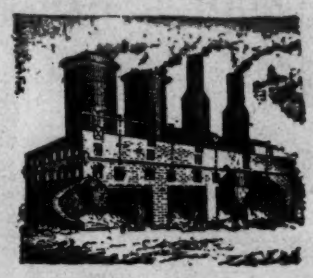

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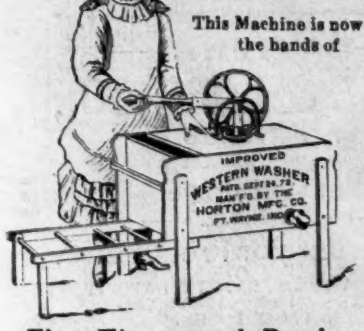

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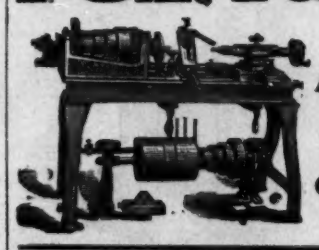

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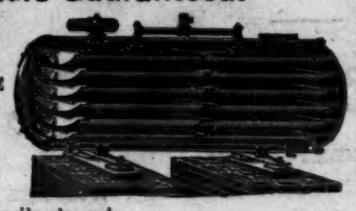

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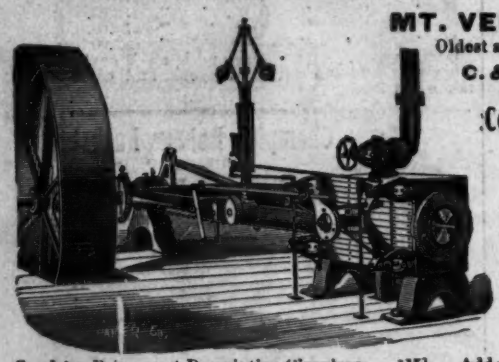

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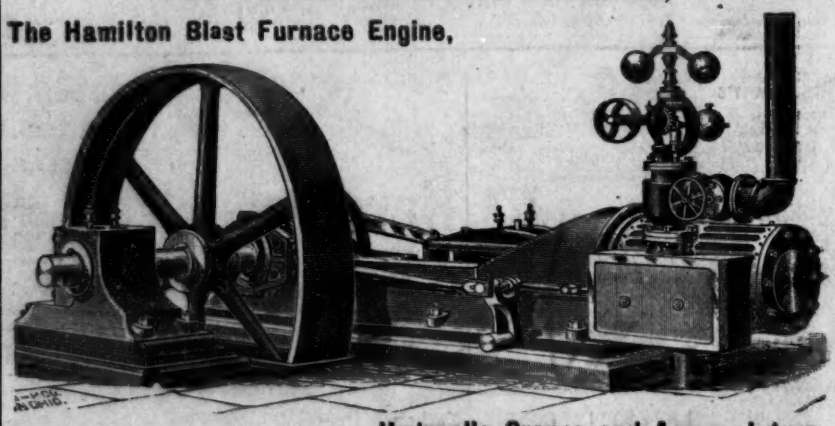

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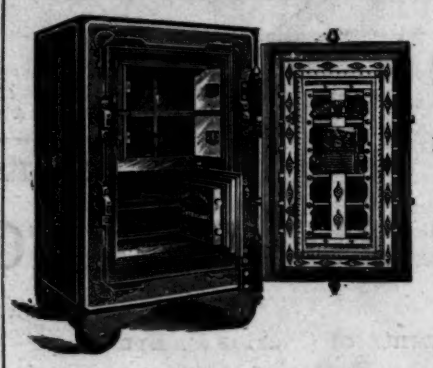

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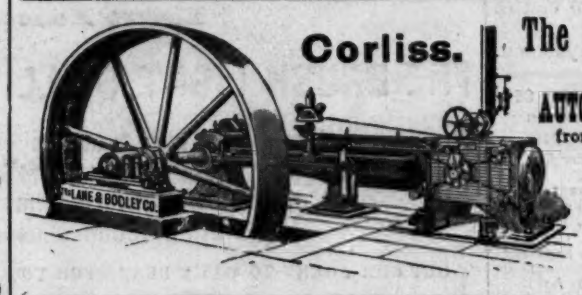

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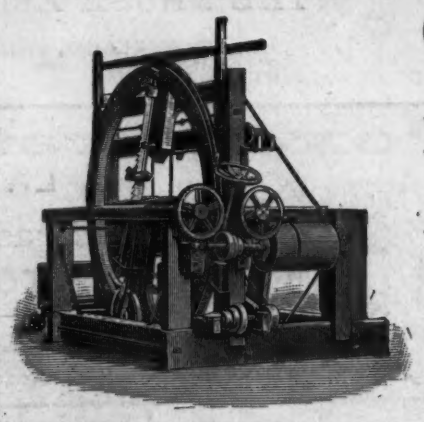

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